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CONTENTS

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.

Sir Seymour Tritton

IN our personal columns this week we record the retirement of one of the well known consulting engineers of our time, Sir Seymour Tritton. His career has been one of remarkable ability and achievement, and, from the time of his training in both locomotive and marine engineering, has been unusually wide in its scope. Though the majority of his work has been connected with the former branch of the profession, his marine training has often stood him in good stead, notably on his arrival in India, when he was faced with the erection of a river flotilla, with no appliances or docks and little skilled labour to assist him. His connection with India and with Indian engineering problems has extended over some 40 years, and the high standard of railway equipment in that country is largely due to the competence of the designing and inspection staff of his firm, for which he was responsible. The discrimination between the essential and non-essential and the courtesy in the spirit as well as the letter of the contract of the inspection staff, is, in his opinion, of the greatest benefit to all concerned. Sir Seymour's work on behalf of the War Office and Ministry of Munitions during the war, was, perhaps, the zenith of this career. It included responsibility for the design or modification and inspection of all new railway work on all fronts including track, locomotives—both steam and petrol—and rolling stock for four gauges, with variations in design to suit conditions in France, Belgium, Africa, Salonica, Egypt, and Mesopotamia. The work also embraced workshops and equipment, special cranes for bridge repairs, ropeways for forward areas and various other devices for transport, and its extent is clearly indicated in the biographical paragraph on page 761. It was for all this exacting and responsible work that Sir Seymour was rewarded with the K.B.E. in 1918. He is a strong supporter of standardisation, but only if it is frequently overhauled and brought up to date by embodying improvements agreed upon by both the users and designers. This is but one example of that broad-minded and progressive outlook that has won Sr Seymour fame, and his retirement is a great loss to the profession. We wish him good health and happiness in his well-earned retirement.

* * * *

Overcrowding on the Edgware Tube

During the past five years the Parliamentary constituency of Hendon has increased its electorate alone by well over 50,000, and this figure gives an indication of the rapidly-growing demands which are being made on the Edgware—Morden Line of the London Passenger Transport Board, for Hendon embraces, *inter alia*, Golders Green, Brent, Colindale, Edgware, and Mill Hill. For some time past the obvious inability of this tube to meet adequately these increasing peak-hour demands has necessitated various train-operating experiments, and some minor resultant dislocation at times has increased the strength of complaints in the press and elsewhere. It is therefore opportune that Mr. Frank Pick, Vice-Chairman of the board, should have issued a full and clear statement of policy regarding transport in this area. This appeared on Monday in the form of a letter to the Editor of *The Times* which we reproduce on page 766. Rolling stock of 14 per cent. increased capacity and relief for Edgware traffic via the L.N.E.R. lines that are to be electrified and linked at Highgate with the tube are jointly estimated to provide 40 per cent. additional seating accommodation in the services for the area in question.

* * * *

The Week's Traffics

No effective comparison can be made between the traffics of the four main line companies for the past week with those for the corresponding period of 1936, which was Good Friday week. Passenger train traffics in the 1937 week are, in consequence, heavily down as they compare with long-distance traffics a year ago. Merchandise and coal receipts, on the other hand, show substantial gains, but not sufficient, except in the case of the London & North Eastern, wholly to counteract the passenger decrease. The L.N.E.R. week ends on a Saturday, but that of the three other companies on a Sunday. For Irish railways the week ends on a Friday, and their latest returns compare with a week in 1936 which included Good Friday. The Great Northern shows a passenger decrease of £1,050 and a goods decrease of £1,300, whereas the Great Southern sets off a goods increase of £2,622 against a passenger decrease of £4,499.

	14th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	−247,000	+109,000	+ 67,000	− 71,000	+ 387,000	+ 2·41
L.N.E.R. ..	−118,000	+ 80,000	+ 64,000	+ 26,000	+ 215,000	+ 1·82
G.W.R. ..	− 86,000	+ 49,000	+ 28,000	− 9,000	+ 189,000	+ 2·90
S.R.	−118,000	+ 7,000	+ 6,000	−105,000	+ 67,000	+ 1·37

London Transport receipts for the week were £575,600, an increase of £49,900.

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"High Railway Officials"

On the fortunately rare occasions when railway accidents occupy much space in the daily press, "high railway

officials" are freely quoted as having expressed opinions to the "special reporters" of various papers. The anonymity of these "high officials" enshrouds deep mystery; we are reminded, indeed, of the formidable Russian spy, Poulispantzoff, in Mr. Stephen Leacock's story, who was smuggled into Tibet in a tea-caddy, but was ignorant of the purpose of his mission because his orders came "from so high up" that he was forbidden to enquire. In reading the statements these "high officials" are quoted as having made, we are sometimes led to wonder whether the adjective is used as a measure of dignity, altitude, or age. One paper has gleaned from such a "high official" the opinion that it might be "well worth the heavy cost to conduct a collision experiment with empty all steel stock." We do not doubt the spectacular value of such a test, but we think it would have a keener human interest, and certainly be more informative, were it carried out with trains filled with "special reporters."

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A French Station Centenary

The station of Denain-Mines, which the French State Railways advise us is the oldest railway station in France, has just celebrated its hundredth birthday and is soon to be pulled down. The building which we illustrate on page 764 is the terminus of a privately-owned line belonging to the Compagnie des Mines d'Anzin that runs from Denain to Anzin, a distance of nine miles. This railway was one of the earliest in France, for, although the first passenger train left this station in 1837, coal trains had been running regularly since 1834. Up to 1935, one of the very early French locomotives was still running regularly on the line, namely, a four-wheeled engine called *Sainte Barbe* which is now in the museum of Anzin. One or two engines still in use on this line date back to 1873, each with its name, a custom recently revived by the French railways. Another relic at Denain-Mines station is the station clock, which was set in place at the time the station was built and was made by Schwilgué, the maker of the famous clock in the Cathedral of Strassburg. This old station clock is worked by weights and its parts are all of bronze, except the pendulum which is made of pine wood. It has never been known to stop or need repair, and therefore is well deserving of the place of honour that is to be found for it in the new station.

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The Anglo-Indian Railwayman

We in this country hear a good deal about the Indianisation of Indian railways, but it may not be generally realised that, in spite of numerical inferiority, the Anglo-Indian (or as it used to be called Eurasian) personnel still forms the backbone of the subordinate staff of most Class I railways. In the Punjab and some of the larger centres there is also a considerable country-bred European sprinkling in the subordinate grades, composed of retired soldiers and men covenanted from Great Britain and their descendants. Consequently, there are, even today, many mail and passenger drivers and guards, workshop foremen and charge hands, permanent way and traffic inspectors, and some senior stationmasters of European or mixed descent, who can be relied upon to carry out their duties irrespective of communal and caste differences. There are, too, the sons of these men and of mixed European and Anglo-Indian marriages, who are training on as firemen, apprentices in the shops and to permanent way inspectors, and in the traffic, signal, electrical, and bridge departments, whose prospects cannot be overlooked in the face of ever-increasing Indianisation. Another very important consideration is that this Anglo-Indian railway staff provides the great bulk of the Auxiliary (corresponding to the Territorial) Force rank and file, whose worth in case of disturbances is invaluable. In fact, the Empire is so greatly indebted to this community for its services ever since Mutiny times, that even if it had not still to be relied upon in the future as a steadying influence in all circumstances, its continued employment and prosperity should be assured at all costs.

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Money Out of Refuse

The Central Railway of Brazil recently instituted an economy campaign in the avoidance of waste. Until 1933, the residues from the manufacture of gas for coach lighting were wasted. Benzol of exceptionally good quality is now being extracted, and is being used as an excellent substitute for petrol in this railway's railcars and for other purposes. This product is also sold at 1$600 a litre (1s. 9½d. a gallon), and as proof of the demand, 26 barrels of 200 litres each (or 1,155 gallons) were recently sold to a firm at Nova Iguassú for 8:320$000 (£104). Petroleum and pitch are also extracted, and the former is used by the Public Health Department for the disinfecting of drains, the pitch being used by the railway in various ways. The most interesting feature of this new source of revenue is that the cost of the whole distilling equipment, which was made out of empty casks and pieces of machinery considered useless, has been practically nil, and it is worked by five unskilled workmen. At the same time coal dust, previously used for levelling purposes in station sidings, is proving a new source of revenue. Common dust is sold at 17$000 (4s. 3d.) a ton, and selected dust at 31$500 (8s.). Waste paper, too, is collected in large quantities and its sale realised 60 contos (£750) in 1935. Similarly packing cases, which are arriving in large numbers from England, with electrical equipment, are selling at satisfactory prices due to their good quality, and the packing straw also finds ready buyers. Used empty oil and grease casks produce as much as 24$200 (6s.) each and other similar articles also are sold to good purpose.

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Accident on the Chicago Rapid Transit System

A collision causing the death of 11 persons and injuries to 58 occurred on November 24, 1936, at Granville Avenue station, Chicago, on the Rapid Transit system, when a Chicago, North Shore and Milwaukee train ran into an elevated line train, the driver failing to keep a proper lookout. There was no excuse for him, as the line is quite straight at this point and the weather was perfectly clear. Although the trains attain considerable speed at times, there is no block signalling of any sort. Signals are used only at interlocking points where it is necessary to work crossovers and junctions. There is a signal box at the Granville Avenue station, controlling 3 crossovers, and the first train was standing at a home signal. Although the speed of the second is said to have been only 10 m.p.h. when the accident happened, the rear and eighth car of the elevated train, constructed of wood, was demolishd, being telescoped for 35 ft., and this no doubt led to the heavy casualty roll. There were two other all-wooden cars in the train, and some with steel underframes only. The colliding train had three all-steel cars. The Bureau of Safety recommends in its report that wooden cars be eliminated from the service as fast as possible, and that their running in association with all-steel, or steel underframed, vehicles should be prohibited. It also strongly urges the introduction of modern track-controlled automatic signals to bring the working of this important class of service in line with present standards.

Belgian Railways Today

Signs of the intensive industrial activity in Belgium today are apparent to the traveller by rail in that country. Very few engines are now to be seen laid up in sidings, and freight trains have increased in number and length. In the more hilly parts where gradients are long and steep, most of the freight trains, which, of course, are all continuously braked, have an engine at each end, not, we understand, merely to increase the tractive effort but as a precaution against coupling failures. Passenger trains are well filled; and railcars, both diesel and steam (Sentinel), are ubiquitous, forming useful connections on the numerous cross-country and branch lines. Besides the impression of activity, there is an air of well-being and self respect about the Belgian National Railways. The trains are fast and punctual—it is rare to find one even a few minutes behind time—and both locomotives and carriages are kept in spic and span condition. The old brown has quite disappeared from the engines and dark green is now the prevalent colour, even for goods stock, though the blue and cream of the railcars and the Brussels—Antwerp electric trains are like occasional patches of hyacinths and daffodils among the grass.

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A Thousand-Mile-a-Year Construction Programme

As we have so often pointed out, the present rate of railway expansion in China is exceedingly remarkable, but the newly-published five-year construction programme is little short of phenomenal. It provides for the addition of 1,000 route miles of line annually, practically doubling the extent of the National Railways system in the next five years. Such drastic measures are dictated primarily by the urgent need for improved long-distance and inter-Provincial communications, for the purpose of ensuring that bandits and local authorities shall not continue to rise at intervals in rebellion, and threaten the peaceful development of the vast area known as China. It is the annihilation of distance in such a country that is so important. The development of agriculture and industry in the interior, and considerations of national defence also demand railway expansion on a large scale. The programme will be financed, at any rate in so far as equipment is concerned, largely by foreign loans. Various European countries appear to be financing and equipping new lines in different zones.

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European Equipment Loans for Chinese Lines

British interests are already contracting to equip the Nanking—Kweichi section of the Nanking—Canton through route, to the extent of £900,000. Also another British material loan of about £6,000,000 is understood to be under negotiation for various other projects south of the Yangtze River. German interests, as represented by the firm of Otto Wolff, of Cologne, are at present equipping the Nanchang—Pinghsiang section of the above route on a long term credit basis, and are also financing the equipment of the great south-western extension from Chuchow, on the Canton-Hankow Railway, to Kweiyang, the capital of Kweichow Province—600 miles in length—which will eventually be continued into the Province of Yunnan, which borders Burma; the sum here involved is about £2,000,000. Szechwan is the zone concerned with French finance, and there equipment and cash construction funds for the Chengtu-Chungking Railway (over 300 miles in length) are being provided out of a £2,300,000 loan from a French syndicate. Belgian interests are centred in the Lung-Hai east—west trunk line and its extensions west of Sian. Japanese influence is being felt only in connection with the proposed Tsangchow (or Tientsin)—Shihkiachwang line in Hopeh Province, but it is also predominant over all the open lines of railway in the northern Provinces of China. All these various new lines are indicated on the sketch map published on page 1078 of our issue of December 25 last.

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Modernising Two Crack American Flyers

With the rapid, and, indeed, exceptional development that has taken place in the speed and comfort of American passenger travel during the past few years, as exemplified in the diesel-electric services now operating between Chicago and the Pacific Coast, it was not to be expected that two such world-famous expresses as the Twentieth Century Limited of the New York Central and the Broadway Limited of the Pennsylvania would lag behind. So far as concerns steam haulage, they certainly have not lagged behind, for in no more than about five years their overall times came down from the 20 hr. between New York and Chicago that obtained for so many years of their history to the 16½ hr. of today. But, as our American correspondent indicates in his message on page 741, their owners are not content to let these flyers remain at their present speed level, and further substantial acceleration is promised during 1937, accompanied by the introduction of streamlined locomotives fitted with roller bearings and of entirely new stock, which, besides being much lighter than that now running, will establish a still further heightened standard in American passenger equipment. Both companies have been studying modernistic coach design, and the Mercury of the New York Central, a streamlined train recently introduced on the Cleveland-Detroit service, is the first step of that company towards " things to come " in the railway realm, as it is generally admitted that the Mercury strikes an entirely new note in American rolling stock.

* * * *

Cab Comfort

Members of the public who at an exhibition of locomotives and rolling stock have paid their shillings and been admitted to the footplate of a locomotive, or who in more privileged or perhaps surreptitious circumstances have availed themselves of the opportunity of so doing without payment, have been known to express surprise not so much at the " vast " size of the engine and profusion of the controls, which, they think, must be very confusing to the driver, but at the fact that seats, oftentimes leather covered and sometimes fitted with backrests, should be provided for the enginemen. They are astounded that those in charge of a locomotive should ever want to sit down or, indeed, find an opportunity of doing so whilst engaged in carrying out their duties. They have even characterised the provision of seats in the cab as " unsafe," and as signifying the modern tendency to " pamper the workman." Such views as these, born as they are of ignorance, may be regarded as unworthy of notice; but as they are fairly representative of the comments made by the uninitiated visitor, it may be as well to remind those who express them that locomotive enginemen are human beings carrying out highly responsible duties and that anything that adds to the comfort and convenience with which those duties can be discharged increases the degree of safety to the travelling public instead of the reverse. Locomotive footplate design has progressed to a state upon which it may be considered difficult to improve. Increased roominess, improved window spaces, convenience of handling, and the provision of seats, have combined to better the lot of the driver and fireman by removing conditions which in earlier times imposed a fairly severe test of physical endurance.

L.M.S. £1,000,000 Motive Power Scheme

WHEN a railway company, or other large industrial concern decides to modernise a substantial portion of its plant at a cost approximating ultimately to £1,000,000, it may be taken as certain that those responsible for the inception and carrying out of the scheme have done everything possible to assure themselves in advance of its success. It requires no small amount of courage as well as confidence to embark on a widespread scheme of reorganisation involving expenditure on such a scale. Moreover, there must be a very clear understanding of problems, the only solution of which is to be found in the vital alteration of methods and replacement of equipment, which latter, although outgrown in capacity, still represents a very considerable capital value, by other and more modern appliances the aggregate cost of which must, of necessity, be extremely high. It was a problem of this character that had to be considered by the Board of Directors of the London, Midland & Scottish Railway when, after mature investigation, a scheme for the modernisation and re-equipment on mechanised lines of the company's motive power depots, prepared by the officers responsible for operating the department, was laid before them. The bold and far-reaching nature of the proposals proved, it may be assumed, a determining factor in the decision to put the scheme into effect and carry it through in its entirety.

The inception of these comprehensive plans was due to Mr. E. J. H. Lemon, Vice President for Railway Traffic Operating and Commercial Departments and, as explained in the articles, the first of which appears on pages 749-753 of this issue, its details were worked out and applied by the officers therein named, under his supervision. It is necessary only to point out that what has to be provided for is the efficient working of an annual locomotive mileage of 230,000,000, involving an expenditure of £12,000,000 in locomotive running expenses alone, to make it abundantly clear that the problem was one of considerable magnitude requiring the most energetic and specific treatment in its solution. The organisation introduced on the L.M.S. is known as the " Motive Power Area Locomotive Supply, Repair, Concentration and Garage Scheme," a title which although at first sight appearing somewhat unwieldy can nevertheless claim to cover all the activities of what for short is commonly known as the " Running Department." It was inaugurated in 1933 and since then no fewer than 47 separate depot modernisations have been authorised at a cost of £750,000 by the board, of which 39 have been completed with highly beneficial results to the company. The data we are able to reproduce in the article appearing in this issue on the subject will suffice to satisfy anyone who studies the figures on this point.

Locomotive engineers have always concentrated their attention on reducing the coal consumption of their engines as far as possible, and quite rightly so, but whilst the significance of this cannot be over-estimated it is important to remember that the nett revenue of a railway company is affected in almost unlimited measure by the adequacy of its locomotive stock to meet traffic requirements. Determining factors in this connection may be taken as (1) mileage to be run, (2) degree of punctuality maintained with booked workings, and avoidance of breakdown of engine diagramming, (3) the amount of work which can be obtained from the locomotives during each 24 hr., and (4) the extent to which engines are stopped for repairs. To obtain a high degree of availability the unproductive time of the locomotive must be cut to a minimum by reducing the time under and awaiting repair, both in the shops and running depots, and also by improvement in the terminal facilities at the sheds to permit of locomotive duties such as coaling, watering, ash disposal, preparation and general shed attention being carried out without congestion or delay.

The scheme adopted on the L.M.S. for the modernisation, involving the mechanisation, of its motive power depots adequately provides for the complete disposal of engines at the depots with much greater expedition than before. This has been brought about by the cutting out of redundant and obstructive engine movements in the yards surrounding the sheds, speeding up of the coaling, watering, ash disposal and turning operations, and other measures. The result is seen in the increased mileage obtained from the engines, the economies effected in time and labour, and a general all-round improvement in the working of one of the largest and most important departments of the railway.

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New Rail Wage Claims

THE much heralded wage claims of the railway trade unions have now been presented to the main-line railway companies, and doubtless arrangements will shortly be made for the claims to be discussed through the appropriate stages of the agreed machinery of negotiation. The claims—recorded on page 767 of this issue—may be divided into two categories, first those for the restoration of what may be termed the " economy " cuts, and secondly claims for improvements in standard wages and conditions. As to the first category, all three unions seek the cessation of the deduction of 1¼ per cent. from all earnings, while the National Union of Railwaymen and the Associated Society of Locomotive Engineers and Firemen are asking for the complete restoration of the standard rates of payment in operation prior to National Wages Board Decision No. 119, dated March 5, 1931, in respect of overtime, night duty, and Sunday duty. Concerning this type of claim the Railway Staff National Tribunal significantly observed in its Decision (No. 2) of December 29, 1936, that " though it is impossible to forecast future results with certainty or to prejudge a future decision, the prospects of an application in regard to a further restoration of standard rates, if made at the appropriate time, would therefore at present appear favourable." The companies have stated on previous occasions that they do not dissent from the view that the relief granted to them under National Wages Board Decision No. 119 was " temporary in character " but opinions will differ as to whether the present can properly be regarded as the " appropriate time " to ask the companies to relinquish the residue of that relief.

The proposed changes in the existing national agreements which arise from the second category of claims will unquestionably meet with more definite resistance from the railway companies. Prominent among the items is the request of the National Union of Railwaymen that the minimum rate of wages payable to any adult shall not be less than 50s. a week. This application raises a fundamental issue, namely the revision of the wage levels fixed immediately after the war, during the period when the railways were in the temporary possession of the Government. Moreover, although the request is expressed in seemingly artless terms, it would not be unfair to infer that it pre-supposes the granting of corresponding increases in certain cases where rates of pay are at present 50s. a week and over. We recall that some six years ago the National Union of Railwaymen put forward a more extravagant claim of the same type. The union then asked that " the minimum rate of adult grades be not less than £3 a week," but the claim was dismissed by

National Wages Board (Decision No. 119). Mention of this decision reminds us that the board also found against a claim for " out of scale " increases for clerks or supervisors who had been standing on the maximum of the class for three years—a claim which the Railway Clerks' Association now revives in not very dissimilar terms. Of the three unions only the Railway Clerks' Association seeks a reduction in hours—to 36 a week—and this despite the fact that the working week of the staff it represents is, generally speaking, considerably shorter than that of conciliation grades. Frankly, we are surprised that the association should put forward such a demand, especially so soon after the tribunal's smashing criticism of the recent Associated Society of Locomotive Engineers and Firemen's claim for a 36-hour week.

The re-submission of the society's claim for increased holidays with pay for enginemen was perhaps to be expected, but the tribunal's brisk remarks concerning the issue when made last December should not be overlooked. The tribunal (Paragraph 10, Part I, Decision No. 2) said " the question can only be properly considered if other grades besides those now before us are taken into account." The tribunal also observed that a more general examination of the problem " would be out of order in dealing with the present claim." Presumably these considerations again apply, for the claim is still made only on behalf of enginemen, no similar claim being made by the National Union of Railwaymen on behalf of conciliation grades generally. The society is asking for a guaranteed day for each time of signing on duty on Sundays and for cancellation of the provision for an extension of rosters, where economy will accrue, up to nine hours a day. The latter item is almost a hardy annual and it seems somewhat unfair that the companies should again have to defend their position, for only four months ago an identical claim was emphatically dismissed by the tribunal, which saw no justification for making any change in the agreements or decisions " which are necessary to the effective working of such an industry as the railways."

So extensive are the programmes that, at the moment it will, we think, be difficult to offer a reliable estimate of the cost of granting them, but even so, it seems clear that such a huge addition to the already heavy burden of labour costs of the companies would be involved that it is inconceivable that the whole of the claims can succeed. Indeed, although Mr. Marchbank's assurance that the unions are " not bluffing " may be accepted, we feel sure that they can scarcely hope to secure any substantial gains, bearing in mind the present position of the railway industry. While, of course, the companies would have preferred to receive no such demands, it is, at any rate, satisfactory that the three unions have found it practicable to adopt the advice tendered in December last by the tribunal concerning the co-ordination of wage claims. The various items differ—perhaps inevitably so—but there has been, on this occasion, simultaneous presentation of all the items to the companies, and this, failing agreement at the intervening stages, will enable the whole of these major issues to be presented to the tribunal " under such conditions as to enable them to be considered adequately in all their aspects." An extensive and costly programme of wage claims was also submitted to the companies last Friday on behalf of railway shopmen who are not dealt with through the main machinery of negotiation, but by a separate piece of machinery. The rates of pay, hours of duty, and conditions of service of railway shopmen were generally determined by Industrial Court Decision No. 728, dated July 8, 1922. It is probable that negotiations in respect of these shopmen's claims—details of which are printed on page 767—will pursue a parallel course to those covering salaried and conciliation grades.

Indian Railways in 1935-36

DURING the financial year ended March 31, 1936, the earnings of all State-owned lines, including those worked on behalf of the Government by companies, increased from Rs. 90·2 crores in 1934-35, to Rs. 90·65 crores, but the net result of the year's working was a loss of some four crores (£3,000,000). Goods traffic increased from 84·5 to 86·9 million tons, and goods earnings from Rs. 64·35 crores to Rs. 64·69 crores. The corresponding net ton mileage rose from 20,352 millions to 20,554 millions, but the average rate per ton-mile decreased from 6·07 to 6·04 pies, or by $\frac{1}{400}$d. only. On the other hand 7,000,000 more passengers were carried than in 1934-35, with a corresponding rise in earnings of from Rs. 30·3 to Rs. 30·6 crores. New State-owned mileage opened for traffic during the year was 71, and there were also 40 miles of privately-owned line opened, but due to realignment, the net addition to the mileage of all railways was only 98, bringing the total up to 43,118. In addition 63 miles of line were under construction on March 31, 1936. The Amritsar-Patti-Kasur Railway, 55 miles in length, which had been previously worked by the North Western Railway on behalf of a private company, was purchased by the Government on December 31, 1935.

Job analysis was continued on most railways during the year under review, and considerable economies were effected. Meanwhile all railways have continued to explore every avenue with a view to increase earnings and reduce operating expenses. Some of the principal measures taken towards these ends were:—

(*a*) *Towards improved earnings.*

Introduction of special rates and fares and greater precision in the analysis of changes in rates and fares.

Adjustment of rates and fares to meet road competition.

Appointment of canvassers to attract traffic, aud special arrangements for rapid and safe transport of particular goods.

Elimination of inter-railway competition.

General improvement in goods services to counter lorry competition.

Arrangements to secure firm rates at forwarding stations.

Special test checks of weights and declarations of goods consignments.

Adoption of measures to prevent overloading of lorries and so reduce unfair competition.

(*b*) *Towards economy in working* (*in addition to job analysis*).

Examination of the handling rates charged at stations.

Introduction of railcars on some lines.

Unification of train examination control at joint stations.

Use of less expensive wood in coach-building.

Closing down certain workshops and running sheds.

Reviewing the financial results of the State-owned railways, it is noticeable that until about the last six weeks of the year ended March 31, 1936, earnings were consistently lower than in the previous year, but they then improved so much as to produce an improvement in the year's total. Ordinary working expenses, excluding depreciation, amounted to Rs. 50·87 crores, or Rs. 60 lakhs more than in 1934-35. This is accounted for by a Rs. 100-lakhs (1 crore) restoration of cuts in pay from April, 1935, without which expenses would have been down by Rs. 40 lakhs. A simplified method of calculating contribution to the depreciation reserve was adopted in 1935-36, by which the contribution for any year is now $\frac{1}{60}$ of the total capital at charge. The amount set aside for depreciation during the year under review was, therefore, Rs. 13¼ crores, or Rs. 47 lakhs less than in the previous year. Including depreciation, operating expenses amounted to Rs. 64·12 crores, or 13 lakhs higher than in 1934-35. Miscellaneous transactions produced Rs. 87 lakhs as against

Rs. 53 lakhs in the preceding year, and there was a decrease of Rs. 10 lakhs in surplus profits payable to companies. The net revenue available for meeting interest charges was Rs. 27·40 crores, whereas the total interest payment due was Rs. 31·39 crores, so that a deficit of Rs. 3·99 crores had to be met by loan from the Depreciation Reserve Fund; it was, however, Rs. 1·07 crores less than in the preceding year. Appropriation to the Depreciation Fund was in excess of withdrawals by 4·09 crores; after the Rs. 3·99-crores withdrawal, the balance at the fund was increased by Rs. 10 lakhs to Rs. 9·60 crores and the nominal balance amounted to Rs. 41·19 crores.

The total works expenditure during the year amounted to Rs. 11·74 crores, of which Rs. 2·58 crores were charged to capital and the balance to the Depreciation Fund. Of these Rs. 2·58 crores, Rs. 29 lakhs were for new construction, and Rs. 45 lakhs for the purchase of the Amritsar-Patti-Kasur Railway already mentioned. Stores balances at the end of the year totalled Rs. 9·40 crores, practically the same as at the close of the previous year. At March 31, 1936, the liabilities of railways to be met in subsequent prosperous years amounted to Rs. 57½ crores, of which 31½ crores constituted the amount borrowed from the Depreciation Fund. The balance of Rs. 26 crores represents the contributions due to general revenues, but unpaid since 1931-32. The following statement summarises the financial statistics for the two years 1934-35 and 1935-36.

	1934–35	1935–36
	Rs. lakhs	Rs. lakhs
Gross traffic receipts	90,20	90,65
Operating expenses	50,27	50,87
Depreciation Fund	13,72	13,25
Net traffic receipts	26,21	26,53
Net miscellaneous receipts after deducting miscellaneous charges and surplus profits payable to companies	53	87
Net revenue	26,74	27,40
Interest charges	31,80	31,39
Deficit	5,06	3,99
	Per cent.	Per cent.
Operating ratio, excluding Depreciation	54·7	54·9
Operating ratio, including Depreciation	69·9	69·5
Ratio of net traffic receipts to capital at charge	3·3	3·4

Only one new railway of any importance was opened during the year, the Jhudo—Pithoro 64-mile metre gauge line in Sind. Four other short lines of from 10 to 16 miles in length were under construction in various parts of the country. On December 20, 1935, the Silver Jubilee bridge over the Nerbudda River, near Broach on the B.B. & C.I.R. was formally opened. It cost Rs. 76 lakhs, and is a double track main line structure. Work on the new Meghna Bridge on the Assam-Bengal Railway progressed satisfactorily; Rs. 14·7 lakhs (out of a total cost of Rs. 56·3 lakhs) were spent on it during the year. The 16-mile extension of the B.B. & C.I.R. Bombay suburban electrification, from Borivli to Virar, was begun; the estimated cost was Rs. 24·83 lakhs. Orders for the following rolling stock were placed during the year; the table also shows the number of vehicles placed in service:—

	Ordered		Placed in service	
	Broad gauge	Metre gauge	Broad gauge	Metre gauge
Locomotives	55	55	35	16
Coaching stock	814	619	349	257
Goods stock	4,358	2,010	3,996	1,441

The locomotives obtained were all replacements and not additions to stock. As 128 broad and 23 metre gauge engines were scrapped, the stocks were reduced by 93 and 7 locomotives respectively. Trials of mechanical stokers showed that they enhanced the capacities of the larger locomotives, but involved heavy maintenance and less efficient coal consumption. On March 31, 1936, the total staff employed numbered 712,364, of whom 3,219 only were Europeans. In accidents to trains, rolling stock, permanent way, &c., only 5 passengers were killed during the year, a decrease of 10 compared with the previous year, in spite of an increase of 3,000,000 passenger train miles. The most disastrous event of the year was the Quetta earthquake on May 31, in which no fewer than 974 railway employees or their families were killed and 813 injured. The restoration of railway property cost Rs. 104 lakhs. (Rs. 1 crore = Rs. 100 lakhs = Rs. 1,00,00,000; and Rs. 1 lakh = £7,500; Re. 1 = 1s. 6d.)

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

The East Anglian

The Information Agent,
London & North Eastern Railway,
King's Cross Station, N.1.
April 13

To the Editor of The Railway Gazette

Sir,—Along with your correspondent "Pertinax" one must pay high tribute to the remarkable service provided by the former Great Eastern Railway in the shape of the Norfolk Coast and other express trains. The small locomotives in use before the war did excellent work but it is not without significance that the management of the G.E.R. found it desirable to introduce a more powerful type of locomotive for its main line passenger services.

From an analysis of published performances of the Norfolk Coast Express during the summer of 1911 one observes the average gross load was 349·9 tons, and had there been an intermediate stop at Ipswich in the schedule of this train an allowance of at least 10 min. would have been necessary to cover it. The corresponding allowance in the case of the East Anglian, which provides for an actual standing time of 4 min. in the station, is 6 min. If, for the sake of argument, the schedule of the Norfolk Coast Express between Liverpool Street and Trowse of 2 hr. 14 min. be expanded to provide for a stop at Ipswich and also for the running from Trowse to a dead stand in Norwich Thorpe station, the journey time would become something like 2 hr. 25 min. between the centres which are shortly to be served by the East Anglian in 2 hr. 15 min.

Conditions today on the Great Eastern Section are very different from those prevailing 25 or 30 years ago, both in the London suburban area and on the main line. As the result of the widening from Romford Junction to Romford Factory the passenger mileage over the London suburban lines was increased by 95,732 annually as from June 1, 1931, and when the greater scheme between Romford and Shenfield was completed on January 1, 1934, there was a further increase in the same area of 122,616 on account of additional passenger trains, together with a further 160,888 miles representing improved services over the main line north of Shenfield. On the section as a whole the passenger train miles per annum have increased by over two millions since 1913, and over a route such as the Great Eastern this increasing traffic density renders the provision of suitable paths for high speed trains a matter of great difficulty.

The L.N.E.R. does not regard the East Anglian as a high-speed train but as providing another satisfactory service in each direction between Norwich, Ipswich, and London at times which will meet the convenience of the majority of travellers between these three places. The train will run all the year round and the streamlining of the locomotive should be helpful in the rough weather which is often experienced in East Anglia in autumn and winter. It may be useful in reducing coal consumption and in avoiding undue strain on the locomotive.

Yours faithfully,

E. G. MARSDEN

PUBLICATIONS RECEIVED

The Stock Exchange Official Year-Book, 1937. London : Thomas Skinner & Co., 330, Gresham House, Old Broad Street, E.C.2. 10¼ in. × 6¾ in. × 4 in. Pages i to ccxxxii, and 1 to 3617. Price £3 net.—Two new features of interest are to be found in this, the fourth issue of "The Stock Exchange Official Year-Book," which incorporates "The Stock Exchange Official Intelligence" and "The Stock Exchange Year-Book." In the present volume the notices concerning fixed trusts have been segregated into a separate section—Fixed and Flexible Trusts, and, amongst the special chapters at the beginning of the book there is a summary of the report of the Board of Trade Departmental Committee on Fixed Trusts and its recommendations as to legislation on the subject. Another new feature of this issue is a list of the British statutory companies which are dealt with in the book. This immediately follows the table of maturity dates which was first introduced two years ago. There have been added in this issue notices of 59 Government and municipal loans and 428 companies. All the essential information required by investors continues to be given in the present volume, which retains all the improvements in handling and reference which were first introduced when the publication was remodelled.

Special financial chapters in the early part of the volume include the results to date of the working of railways in India and of the State-owned railways in the Dominions and Colonies, and also the rates per £1 at which foreign currency figures have been converted into sterling. There is also a chapter on Company Law in 1936. Very full and up-to-date information on the status, working contracts, and results of Indian railways is given in the chapter on Indian finance and in respect of individual companies under the heading "Indian Railways" in the main body of the work. As an instance, we may mention the revised arrangements between the Secretary of State and the Madras & Southern Mahratta Railway Company as to the termination of its contract. Under the heading "Public Boards" will be found full particulars of the London Passenger Transport Board and of the Northern Ireland Road Transport Board. Details of the London Electric Transport Finance Corporation and of the Railway Finance Corporation appear under "Financial Trusts, Land, and Property."

Working results from 1927 to 1936 inclusive of the four principal British railway companies are given and also their investments in other transport undertakings. Railways wholly or partly in Northern Ireland are included in the section "Railways—Great Britain and Northern Ireland," whereas particulars of the Great Southern Railways appear under "Railways—Dominion and Colonial." The Foreign Railway section is comprehensive and contains the latest available information as to schemes of arrangement and Government purchases. Towards the end of the book is the supplement containing information received too late for classification. This makes reference to the issue of Railway Clearing House Railway Freight Rebates Fund Stock, to the debenture stock conversion and amalgamation scheme of the Rhodesia and Mashonaland Railways, to reorganisation plans of the Chicago & North Western and of the St. Louis Southwestern Railways, and to the purchase of the Cordoba Central Railway. After the supplement will be found the usual particulars relating to stamp duties, trustee investments, income tax, estate duty, etc.

The Other Man's Job. By E. P. Leigh-Bennett. London : George Allen & Unwin Limited, Museum Street. 9 in. × 6 in. × 1¼ in. 281 pp. Price 10s. 6d. net.—As is well known to all who read the Southern Railway quarterly review "Over the Points," Mr. E. P. Leigh-Bennett specialises in interpreting the layman's reactions to mechanised industry. Plenty of other authors are attempting the same thing at the present time, but few achieve the same vividness of style, coupled with accuracy of information. Mr. Leigh-Bennett avoids that straining after effect of which some writers are guilty in describing the work of the men who keep the industrial wheels turning, and it is from his juxtaposition of the routine task with the vital services dependent upon it that the author gains his effects. Readable as his own comments invariably are, it is his care to reproduce the terse and illuminating observations of the men concerned that gives his book its authenticity.

Railway scenes, largely on the Southern, are naturally to the fore, and the chapter headed "Railway Roundabout" is a remarkable portrayal of railway work in its urban and rural phases. From the country porter whose report on the conditions under which he released a crate of pigeons read "weather dry, so am I," to the barrage of questions that pours into the enquiry office at London Bridge, this is splendid entertainment all the way. For skilfully restrained drama we would recommend the chapter on the arrival of a liner in the King George V graving dock at Southampton ; and for fascinating casualness in the treatment of an imposing theme, the description of a few hours at Croydon airport. In his various footplate journeys Mr. Leigh-Bennett gives all the sound and colour to be expected, but he goes one better than most writers by sparing time to travel with the guard of a fast goods, where "we have our little verandah in the rear, on which a brace of Devon rabbits hang swinging in the night air. . . . Our door to the verandah shakes upon a falsetto note which it holds interminably. The body is thrown from side to side, forward and back."

There are seafaring sketches, too, in this book, and even glimpses of the smooth-working organisations that supply us with electricity and gas. Whatever he describes, Mr. Leigh-Bennett illumines with a gift of understanding which will help his readers to appreciate the many services they receive from public utility undertakings ; and also to pause and consider the complexities of "the other man's job" before embarking upon criticism.

Summer Holidays in the British Isles.—Thos. Cook & Son Ltd. has now issued the 1937 edition of this attractive booklet, which sets forth a wide range of suggested holidays at home. Holiday-makers, however, are not limited to the attractive tours that have been prepared, as variations may be made to suit individual tastes.

Belgian Holidays.—Three illustrated folders from the Belgium-Luxembourg Touring Office, 48, Place Brouckère, Brussels, show the very varied appeal which this country offers to the visitor. For the pleasure-seeker pure and simple, there are the celebrated Belgian coastal resorts, the scenic, social, and sporting attractions of which are represented in a varied selection of photographic reproductions in one pamphlet. To the scenery lover, Belgium offers the Ardennes, and in this picturesque area the railways have arranged several itineraries taking in the centres of greatest scenic appeal. The third folder deals with the art cities of Belgium, and is distinguished by a fine reproduction in colour of Rubens' "Adoration of the Magi," to be seen in Antwerp Museum

The Rightward Method of Oxy-Acetylene Welding.—"Applied commonsense" is the description given to the welding method described in this illustrated technical booklet issued by the British Oxygen Co. Ltd., Thames House, Millbank, Westminster, S.W.1. No additional plant, gases, or fluxes are needed, and it is the object of the booklet to show that oxy-acetylene welding, applied according to the principles described, has a much larger scope than is usually realised. It is shown to be an efficient method of joining steel plate of the thicknesses most commonly met with in industry, without the necessity of bevelling edges when making butt joints in steel plate of thicknesses up to ⅜ in. In rightward welding, also known as backward or backhand welding, the weld is carried out in a left-to-right direction, the blowpipe preceding the welding rod along the direction of the seam. The consumption of welding rod is much reduced ; the operation is speeded-up by the elimination of bevelling, and by the fact that it is unnecessary to remove the rod from time to time to gain an uninterrupted view of the bottom edges of the vee, as in leftward welding ; and a joint with high metallurgical and mechanical properties results.

THE SCRAP HEAP

Answer to Railway Problem No. 1

88,000. If x people left umbrellas, then total number left = x + (4 per cent. of x) + (twice 2.5 per cent.) + (7 times 0.5 per cent.) = $x + \frac{x}{25} + \frac{x}{20} + \frac{7x}{200} = \frac{9x}{8}$. Then $99{,}000 = \frac{9x}{8}$, whence $x = 88{,}000$.

* * *

Railway Problem No. 2

GETTING TO THE OFFICE

My next door neighbour, whose office happens to be in the same block as mine, goes up by bus while I go by train. Though the train route is 1½ miles longer than the bus route, the rate of travelling by bus is ⅔ that by train. If we start at the same time, we arrive at our destination together. What is the distance by train?—*From "A Problem a Day," by R. M. Lucey. Faber & Faber. 5s. net.*

* * *

MR. MAXTON AND MINISTERS' HOSPITALITY

Mr. Maxton (Glasgow, Bridgeton, I.L.P.), speaking on Monday in opposition to the Bill for increasing the salaries of Ministers of the Government, said he hoped that the chief attraction of public service of any description would never be the monetary reward attached to it. They had been talking airily of salaries of £5,000 and £3,000 being too small. He had heard a lot about the expenses attaching to the holding of such offices and about the huge sums expended on hospitality by Ministers of the Crown. He seemed to have been missing something during his 15 years as a member. (Laughter.)

He had received invitations to the Palace on occasions, and he had received invitations to partake of the hospitality which Mr. Speaker extended to all members of the House. But he could not remember any occasion, except one, when he was offered hospitality by a Minister. (Laughter.) He was once invited by the Secretary for Scotland to go over to the Scottish Office and look out of the window at the Trooping of the Colour. (Laughter.) He was told that if he had gone there he would have found that cigarettes were handed round; but he was also told that the box of cigarettes handed round had been collected by the Secretary of State for Scotland from some banquet that he had attended. (Loud laughter.)

* * *

TUNNEL LINED WITH ZINC

At the Chevet tunnel on the North Midland Railway about three miles from Wakefield, workmen are busily engaged lining the roof with zinc, which is the means of effectually preventing the continual dropping to which the tunnel was subject.—*From "The Derby Gazette" of January 20, 1842.*

CORONATION WEATHER

Most of us think of St. Pancras as a London railway terminus with a name reminiscent of an obscure corner in our internal economy, and not as a young Roman noble who suffered martyrdom under Diocletian and became the patron saint of children. On the Continent he is best known as one of the three "Ice Saints," or "Icemen." Pancras has his festival on May 12: his two collaborators, Mamertius and Servatius, occupy the adjacent dates, May 11 and 13.

Over the greater part of Western, Central and Northern Europe, and especially in France and Germany, agriculturists have, for many generations, dreaded these three days. On their approach, special precautions are still habitually taken to guard against frost, snow, hail, and nipping winds. Rabelais wrote of the Ice Saints' powers as being well recognised in his time (1483-1553), and probably the belief in them is much older than that. Its survival into the twentieth century is no matter for surprise. Out of all the wealth of weather lore that has been handed down through the ages, there is, perhaps, none more justifiably credited than the tradition of a cold snap around the middle of May. It is about this time that winter generally delivers its dying kick, and summer, if she is already on the threshold, suffers a rude rebuff for a few days.—*From "Buchan's Days."—A Modern Guide to Weather Wisdom, by E. L. Hawke, M.A., F.R.A.S., Secretary of the Royal Meteorological Society. Lovat Dickson. 5s.*

* * *

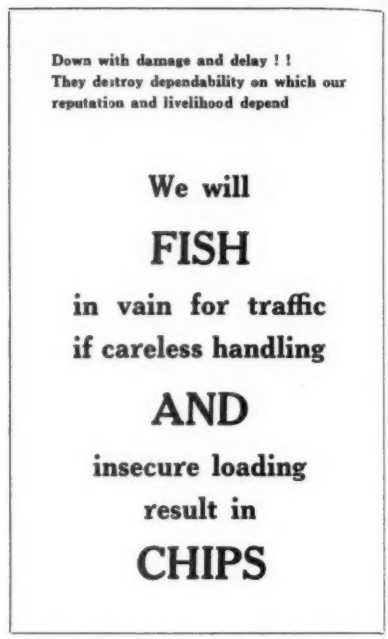
Some railway extracts from a letter written on December 4, 1836, have recently been sent to the Southern Railway, and reproduced in the *Southern Railway Magazine*, whence we extract them. They came from Mr. J. Edmund Clark, of Street, Somerset (a veteran who says he made his first journey by London & South Western Railway as long ago as 1863). The letter was written by his uncle, Samuel Stephens, who was surveyor in 1836 for the projected Portsmouth Junction Railway. Writing from Fareham to his sister, Mr. Stephens began with the parody of a song of the day:—

No tongue can tell how day and night,
Indoors and out with all his might,
He strove the plans to set aright
Of the 'Portsmouth Junction Railway.'
With staff and staffmen in his train,
And sextant, level, flags and chain,
Reckless of dirt and wind and rain
By the lash of November's gloomy rain,
He found that his efforts were not in vain.
For by stealing from his hours of rest,
And cutting short his dinner zest,
The line was surveyed with complete success,
Of the 'Portsmouth Junction Railway.'

The letter continued: "Latterly, however, I have had no time to think of anything else except the matter I have in hand. My berth has been no sinecure, for I have had indeed an arduous task to get through, but happily I have succeeded in accomplishing it so far without any assistance. Although we shall have much to struggle for in obtaining our bill, I am more sanguine than I was as to its success, and that feeling is increased by the result of a large meeting at Fareham of the opponents of the bill which took place on Friday last. It was a very stormy meeting, and much acrimonious feeling pervaded parties on both sides. Nothing decisive was done there but, from the parties who attended, we are convinced that we have very little to fear from our opponents. The array against us was not nearly so formidable as we expected and not men who have sufficient influence to contend against the vast wealth and interest of the directors of our company. The company is therefore determined to proceed with the bill, and there does not appear to be much doubt that they will obtain it. There are now no rival lines for us to contend with, the 'Portsmouth Direct and 'Eastern Lines' having given up the ghost some time ago."

* * *

There is a six-year-old boy in New York who ought to make a good railway president one of these days. "Where," asked his mother, "is the toy railroad I gave you on your birthday?" Young hopeful hesitated, but replied, "Oh! it has gone into the hands of a receiver." "Indeed!" said the mother; "and I suppose it will be reorganised?" To which came the answer, "Yes, mummy; and you will be assessed $10 under the plan."—*From "The Railway News" of June 20, 1896.*



No. 8 of a new series—the third—of "claims prevention" posters issued by the Chief Goods Manager, G.W.R., for exhibition to the staff

OVERSEAS RAILWAY AFFAIRS

(*From our special correspondents*)

UNITED STATES

Further Orders for Modern Trains

The New York Central and the Pennsylvania Railroads' Twentieth Century and the Broadway Limited expresses will shortly be equipped with new up-to-date lightweight rolling stock. The new cars will represent a saving in weight of some 40 per cent. as compared with existing stock. When these new cars are introduced, probably with the inauguration of summer time on April 24, these trains will be accelerated, possibly to an overall time for the journey of 15 hr., as compared with the present 16½ hr. All cars used on these trains are owned and operated by the Pullman Company. The locomotives for these trains are to be streamlined and to be fitted with roller bearings. [We refer to this in an editorial note on page 735.—ED. *R.G.*]

The Atchison, Topeka & Santa Fé likewise will shortly use new lightweight stock exclusively, in its daily Chief services between Chicago and the Pacific Coast. A total of 67 vehicles will be required for these trains.

More Articulated Engines

The Northern Pacific has ordered six additional 4-6-6-4 type locomotives for its subsidiary, the Spokane, Portland & Seattle, thus further emphasising the popularity of this single-expansion, articulated, high-speed type of engine. Orders for all classes of rolling stock continue to be placed with unabated intensity. The need for such additions by some railways is acute; and, further the market has doubtless been stimulated by proposed increases in the prices of steel and other materials, and by the unprecedentedly low interest costs at which rolling stock purchases can be financed. (The current cost of equipment loans for repayment in instalments ranging over 10 to 15 years averages 2½ per cent. per annum.

New Stock for the Southern Pacific Day Expresses

For a number of years the Southern Pacific has operated fast expresses in daily service in each direction between Los Angeles and San Francisco, known as the Daylights. Recently new streamlined 4-8-4 locomotives and modern coaching stock, some of it articulated, has been installed in these services, 12 vehicles to each train. The composition of each train is as follows: One van-coach composite (44 seats); one coach (48 seats); six coaches, articulated in pairs (total 300 seats); one tavern car (42 seats); one restaurant car (40 seats); one parlour car (33 seats); one parlour-observation car (41 seats), grand total, 548 seats. The cars are built of lightweight steel and the train has a tare weight of 511 English tons, or one-third less than conventional cars heretofore used. The cars have striking orange liveries with red and black striping. Interior decorations are modernistic.

Union Pacific Turbo-Electric Locomotive

A turbo-electric locomotive which will develop 5,000 h.p. is under construction for the Union Pacific Railroad and will be used to haul heavy trains of standard-weight passenger stock through the Rocky Mountains.

Level Crossing Elimination

More than three-fourths of the Federal Government's £40,000,000 scheme for level crossing protection or elimination has been completed or is in progress, and an additional £10,000,000 have been appropriated for this purpose. More than 1,700 separation projects have been completed or are in progress, and automatic signal protection has been provided at more than 400 places.

INDIA

Road Motor Competition

The terms of reference of the Wedgwood Committee included a special direction to examine the road-rail imbroglio in India and submit recommendations for its solution. The position in regard to road motor competition is reviewed in the annual report by the Railway Board on the administration of Indian railways during 1935-36.

A.-B., B & N.W., B.-N., and B.B. & C.I.R.

On the Assam-Bengal Railway, the sections mainly affected by road competition are the Silchar—Sylhet, the Furkating—Badulipara—Jorhat, and the Chaparmukh—Silghat. The administration has endeavoured to meet this competition by the improvement of train services, and has also been considering the question of reducing third class fares on the Sibsagar—Khowang and the Chaparmukh—Silghat sections.

Road competition principally affects passenger traffic on the Benares—Allahabad route of the Bengal and North Western Railway. Reduced return journey fares were introduced to prevent the diversion of traffic to the road.

Reduced fares were in operation on certain narrow and broad gauge sections of the Bengal-Nagpur Railway, particularly vulnerable to road competition. Considerable goods traffic is being diverted to the road between Calcutta and Ranchi, a distance of about 250 miles, and the Bengal-Nagpur Railway had to reduce freight rates and to accelerate goods transport to keep the traffic.

The B.B. & C.I.R. administration launched special inquiries to ascertain the loss caused by road competition. On the basis of an actual count over a short period, the loss on account of the diversion of third class traffic was estimated at Rs. 28 lakhs per annum, excluding the loss of revenue consequent on the reduction of fares and the increased expenditure incurred by augmenting the normal daily services. The loss on account of the diversion of goods traffic to the road was also being investigated. The railway sought to regain some of the lost traffic by the quotation of special rates.

E.B. and E.I.R.

The Eastern Bengal Railway introduced third class ordinary return tickets in local booking and thus arrested the diversion of traffic in the Calcutta suburban area and on certain metre gauge sections where motor competition was keen. This railway has been examining the feasibility of running diesel-electric units on the Sealdah—Budge Budge section so as to provide an accelerated and more frequent service.

A decline in the number of buses licensed for operation on the road routes along the East Indian Railway somewhat improved the competitive position, though competition was still intensive on certain sections. Substantial reductions of fares, the provision of increased facilities, and the co-ordination of road-rail services at Mussoorie and Patna arrested further diversion of passenger traffic. The provision of additional train services is estimated to have increased train mileage by 880,000. Competition from lorries for goods traffic was intensified practically throughout the East Indian Railway system, resulting in considerable loss of revenue both through actual diversion and by reductions in rates forced upon the railway to check such diversion. This competition was particularly keen between Calcutta and the coalfields, and was not confined to short distances. Regular road services were available for the transport of merchandise between Calcutta and large towns in the United Provinces and the Punjab. It was considered that gross overloading of vehicles made such competition possible. Reduction of rates, acceleration of goods services, improvements in booking and delivery arrangements, and inauguration of collection and delivery services at selected stations were the principal measures taken to meet the competition.

G.I.P., M. & S.M., and N.S.R.

Competition for passenger traffic did not show any appreciable sign of abatement on the Great Indian Peninsula Railway, except on the Pulgaon—Arvi section, where the reduction of lower class fares and the introduction of diesel

unit services proved effective. Road competition for goods traffic became more acute and widespread during 1935-36 necessitating the reduction of freight rates to prevent further diversion of traffic to the road.

Road services continued to divert traffic from the Madras & Southern Mahratta Railway. Not only were additional passenger buses put on the road, but there was also a considerable increase in the number of lorries operating for the transport of merchandise. Consistent overloading and the evasion of taxes made such competition possible. A new feature in road competition appeared during the year in the diversion of traffic in produce by road to minor ports on the west coast for shipment by country craft to Bombay. Reduction of rates and fares, provision of special services for certain traffic and improvement of train services, including additional diesel car services, were some of the measures adopted to counter road competition.

On the Nizam's State Railway, there was a small increase in the route mileage operated by the State road mechanical transport services, which showed satisfactory financial results. The earnings per mile of the suburban services declined on account of there being little or no control over the activities of privately-owned buses. The introduction of new State motor vehicles rules was under contemplation.

N.W.R.

Intensified road competition was experienced on the North Western Railway during 1935-36. Some of the organised companies which ran motor services to regular timings and at fixed charges broke down through lack of funds, but others sprang up in their places. The issue of cheap single and return journey tickets, combined with augmented and accelerated train services on sections where road competition was severe had encouraging results. Through road-cum-rail tickets were introduced for journeys between Lahore and Kashmir, in conjunction with an organised road transport company, in order to counteract the tendency of passengers to travel wholly by road. Prior to 1935-36, road competition for goods traffic was felt principally for distances within 50 miles, but during 1935-36, this form of competition was spread over a wider zone. The railway had under examination the question of an extension of the system of door-to-door delivery by railway at certain important stations.

GERMANY

Abolition of Ludwigshafen Division

On March 31 the Divisional Management of the Reichsbahn at Ludwigshafen was abolished and the lines formerly controlled by it were divided between the Mainz and Saarbrücken Divisions, except such as were transferred on February 1 to the Divisional Management at Karlsruhe. A temporary staff will remain at Ludwigshafen for a time, subordinate to the offices at Mainz, to assist in keeping touch with customers and enabling the transference of business to be smoothly effected. The lines west of Landau, Hochspeyer, Enkenbach, and south of Lauterecken-Grumbach and Altenglan now come under Saarbrücken, those to the east and north under Mainz.

BRAZIL

The Leopoldina Railway

Following the request made by the President of the Republic to the House of Deputies for authorisation to grant loans to the Leopoldina and Great Western of Brazil Railways, Deputy Damas Ortiz asked the Minister of Labour, Industry, and Commerce to inform the House if any complaints from the employees of the Leopoldina Railway, relating to bad or unjust application of Brazilian social legislation were pending; and, if so, what were the solutions demanded. He also asked that the House be informed whether the Leopoldina Railway had executed in all sections the terms of the " Two-thirds " law, and if the administration was complying with article 121, paragraph 1, letter A, of the Federal Constitution, whereby Brazilian workers, chiefs of service and technical employees should receive equal salaries and enjoy the same advantages as English employees in similar grades. [The " Two-thirds " law provides that this proportion of the employees, or grade of employees, of any foreign concern established in Brazil, be Brazilian born subjects, and that equal remuneration be paid for posts classified in the same category.—ED. *R.G.*]

Viação Ferrea do Rio Grande do Sul

The first part of the Quarahy branch line, from Severino Ribeiro to Porto Marcellino, on this railway, to which reference was made in THE RAILWAY GAZETTE of January 15, has now been opened for traffic. Construction on this branch was re-commenced after General Flores da Cunha assumed the governorship of the State, and the work has been carried out without the aid of private loans, thanks to the co-operation of the State Military Brigade with railway labour. Only 10 km. have now to be concluded.

Central Railway

The gross receipts of this railway for the year 1936 amounted to 195,000 contos excluding amounts due from Government Departments for services rendered, and revenue due from other railways, not yet allocated by the Clearing House, for transportation of interchange traffic. This total compares with 181,734 contos in 1935; the previous highest total recorded was 185,633 contos in 1929.

The Minister of Finance has authorised the Central Buying Commission to purchase in local currency and import for consumption on this railway, 300,000 tons of coal from Germany. Under similar conditions 7,134 tons of coal briquettes are to be imported from Cardiff.

ARGENTINA

Joaquin V. Gonzalez-Pichanal Line

Work is proceeding rapidly on the construction of this branch of the State Railways in the Province of Salta, and it is officially stated that the Government proposes to spend the sum of $4,500,000 on its continuation during the current year. Of this amount $900,000 paper will be expended on the erection of station buildings, warehouses and accommodation for the staff, &c., and the remainder on the construction of two metal bridges across the San Francisco and Dorado rivers, one of nine spans with a total length of 600 m., and the other of eight spans with a total length of 480 m.

Third Group of Terminal Grain Elevators

The committee in charge of the supervision of the construction of grain elevators has solicited authority from the Ministry of Agriculture to call for tenders, within the Republic and abroad, for the construction of the third group of terminals, comprising one at San Nicolás (Central Argentine Railway), with a storage capacity of 56,000 tons; one at Mar del Plata (B.A.G.S.R.), with a storage capacity of 10,000 tons, to be increased later to 20,000 tons; and one at Gral. José F. Uriburu (Zárate) (C.A. and Central of B.A. Railways), with a storage capacity of 10,000 tons. The construction of these three elevators will complete the entire scheme of terminals. A period of 4 months is allowed for the presentation of tenders, and the time limit for the actual construction varies between 19 and 30 months. The study of the tenders received for the first group of elevators to be erected at Buenos Aires, Quequen, Villa Constitución, Rosario (2) and Ingeniero White has been concluded, and contracts to a total of $35,000,000 paper will be awarded shortly. Tenders for the second group, comprising those at Santa Fé, Diamante, Concepción del Uruguay, La Plata and Riachuelo for approximately $15,000,000 paper, were opened on March 18.

Maize Sowings

The first estimate issued by the Ministry of Agriculture of the area sown with maize this year puts this at 6,600,000 hectares (16,500,000 acres), or 13·5 per cent. below that of the previous season, which was 7,630,000 hectares (19,075,000 acres), the highest on record. But as the average for the last 10 years is 5,755,727 hectares (14,389,317 acres), this year's figure is

very satisfactory, and indicates that the position of Argentina in regard to maize production is entirely favourable, as there is always the possibility that the smaller area sown may be compensated by a heavier yield per hectare.

U.S.S.R.

Locomotive Matters

One of the " JS " (J. Stalin) class of two-cylinder 2-8-4 locomotives has been streamlined on the principles adopted by the New York Central Railroad for its 4-6-4 engine *Commodore Vanderbilt*. The Soviet engine is capable (track permitting) of a top speed of 140 km.p.h. (87 m.p.h.), and attained this speed during recent trials between Voroshilovgrad and Kharhov.

A number of test runs with heavy freight trains have been made recently on the trans-Caucasian line between Baku and Batoum. With trailing loads of 2,500 tons, 5½ hr. were cut from the normal schedules of 25 hr. for the 897-km. (556-mile) journey. Running via the Moscow-Donbass direct line, trials have been made between Rostov and Moscow with trains made up of 18 passenger cars fitted with automatic couplers and weighing 888 tonnes. Russian-built freight locomotives of the FD class 2-10-2 type were used in preference to the standard 2-8-4 passenger type. Normal journeys with 12-car trains usually take nearly two days for the 775 miles.

New Moscow By-Pass

At long last a through goods line by-passing entirely the city of Moscow is to be built, and construction is to begin almost immediately. It will connect Alexandrovo station on the Jaroslav railway with Shilevo station on the Donbass direct line, passing to the east of Moscow via Belkovo, Ilinski Pogost, and Voskresensk, and having a length of over 100 miles.

Map showing new line being constructed to avoid passing through Moscow

Connections will be made with the Kazan, Gorki, and Riazan lines running out of Moscow to the east and south-east. The existing single track between Alexandrovo and Ilinski Pogost is to be reconstructed and doubled; a new double-track line will be built between Ilinski Pogost and Shilevo, and will include a ferro-concrete bridge over the Moscow river at Voskresensk.

Frozen Points

Over 100 pairs of points at the Dsershinski terminus in Moscow have been kept clear of snow and ice during the present winter by compressed air jets from permanent connections against each switch. Although this, together with mechanical snow removers—which clear the snow from the lines and deposit it in trucks on adjacent tracks —have resulted in a great reduction in labour compared with the 70 or 80 men who previously were employed during every big storm, it is believed that as much satisfaction has not been obtained as with the electric and steam heating plants installed in other Moscow termini.

DENMARK

Grounding of Diesel Ferry

Besides the several interruptions to traffic caused by the severe ice conditions this winter already recorded in THE RAILWAY GAZETTE of April 2, the State Railways also had the misfortune that one of the large diesel ferries of the Great Belt service, mf. *Korsør*, ran aground close to Nyborg in a dense fog and defied all efforts to shift it for 12 days. Matters were complicated by the fact that the tide was high when the mishap occurred, and it finally proved necessary to transfer 18 goods trucks from the grounded vessel by means of a large breakdown crane placed on a smaller ferry moored alongside. The lifeboats and anchor-chains had already been removed to lighten the vessel, and it then proved possible to tow the ferry off with assistance from three other ferries. The *Korsør* was undamaged and was immediately put into service again.

CHINA

Catering for the Tourist

With the object of stimulating tourist traffic by rail to Hangchow, the capital of the Chekiang Province, tests have been made to accelerate the train service on the Shanghai—Hangchow—Ningpo Railway between Shanghai and Hangchow, and it has been found that the journey can be completed in 3 hr. This is a saving of 1½ hr. on the present running time, and a new accelerated service will be put into operation in time for the coming tourist season. Hangchow is situated in the midst of lake and mountain scenery, and has many historic associations, and the improved service will enable visitors in ships calling at Shanghai for a limited time to make the journey and re-join their ships, thus affording them an opportunity of seeing something of the Chinese countryside.

The Ministry of Railways is appropriating $130,000 annually to send students abroad for technical education.

New Lines in South China

The Ministry of Railways has given instructions for the completion of the Canton-Whampoa railway extension of the Canton-Hankow line to enable it to be opened for operation by July next. Additional labour has been drafted to the work, and the Nanking Government is issuing $7,000,000 National Currency bonds to meet expenses in connection with this railway and harbour scheme.

Arrangements have been made to begin work on the Foochow-Nanchang Railway. The first section to be constructed will be from Yenoing in central Fukien to Kweichi in Kiangsi.

Lienyunkang Harbour Works

The great work of converting the bay between the mainland and Silientao Island into a sheltered harbour as the terminal of the Lung-Hai Railway at Lienyunkang in the Province of Kiangsu, has now been completed by the Netherlands Harbour Works Company of Amsterdam. [This was referred to previously in these columns in the issue of August 28 last.—ED. *R.G.*] The works as now completed are merely the first stage leading up to more comprehensive developments to follow.

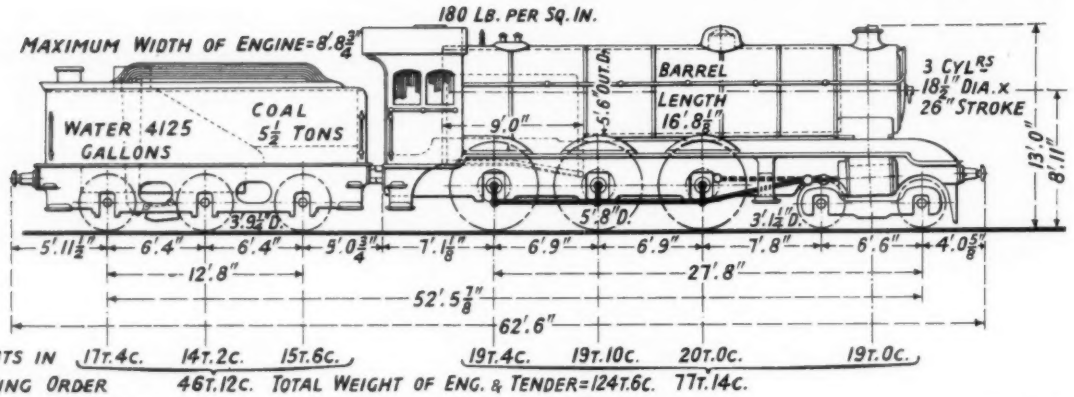
SWITZERLAND

New Federal Railways' Grain Warehouse at Romanshorn

The Swiss Federal Railways recently opened a new grain warehouse at Romanshorn, replacing an old wooden structure that had become inadequate. The new building, situated in the immediate vicinity of the station and the port on the Lake of Constance, has a capacity of 8,500 tonnes, of which 2,500 tonnes are in 50 silos for bulk grain. The floor surface is 4,400 sq. m.

One of the illustrations on page 759 shows one of the chutes just below platform level, into which the wagons discharge the grain, which falls on to a conveyor and is afterwards hoisted by an elevator to the separator in the tower of the building. The grain is then automatically weighed and served to other conveyors which run the length of the silos. The reverse process is similar, and the grain is fed directly into the wagons through a pipe which is also visible above the chute in the illustration. Grain in sacks is handled by chutes and conveyors. The illustrations have been prepared from photographs by R. Kielinger, of Romanshorn. The Federal Railways also own warehouses at Basle, Zurich, Buchs, Brunnen, Brigue, Renensand Morges, and petrol stores at Basle and Buchs.

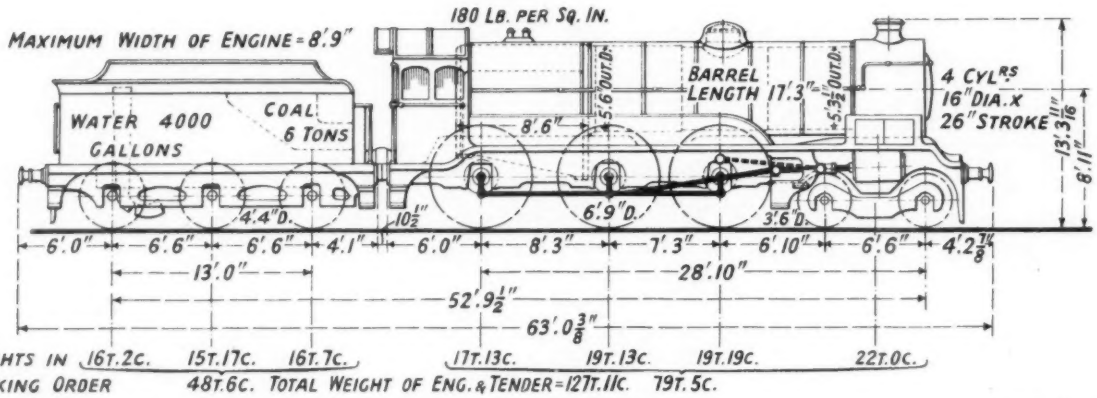
British Locomotive Types—IX



HEATING SURFACE, TUBES—		SUPERHEATER	436·8* SQ. FT.
LARGE AND SMALL	1,672·5 SQ. FT.	COMBINED HEATING SURFACES	2,275·3 ,,
FIREBOX	166·0 ,,	GRATE AREA	27·0 ,,
TOTAL (EVAPORATIVE)	1,838·5 ,,	TRACTIVE EFFORT (AT 85 PER CENT. B.P.)	30,031·0 LB.

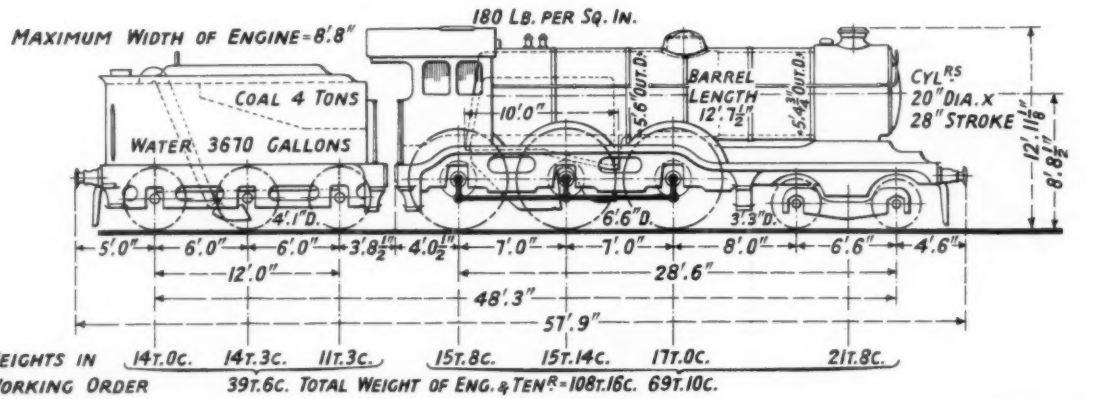
* In some of these engines the superheater surface is 392 sq. ft., making the combined heating surfaces 2,230·5 sq. ft.

B.16 Class



HEATING SURFACE, TUBES—		SUPERHEATER	343·0 SQ. FT.
LARGE AND SMALL	1,881·0 SQ. FT.	COMBINED HEATING SURFACES	2,387·0 ,,
FIREBOX	163·0 ,,	GRATE AREA	26·0 ,,
TOTAL (EVAPORATIVE)	2,044·0 ,,	TRACTIVE EFFORT (AT 85 PER CENT. B.P.)	25,145·0 LB.

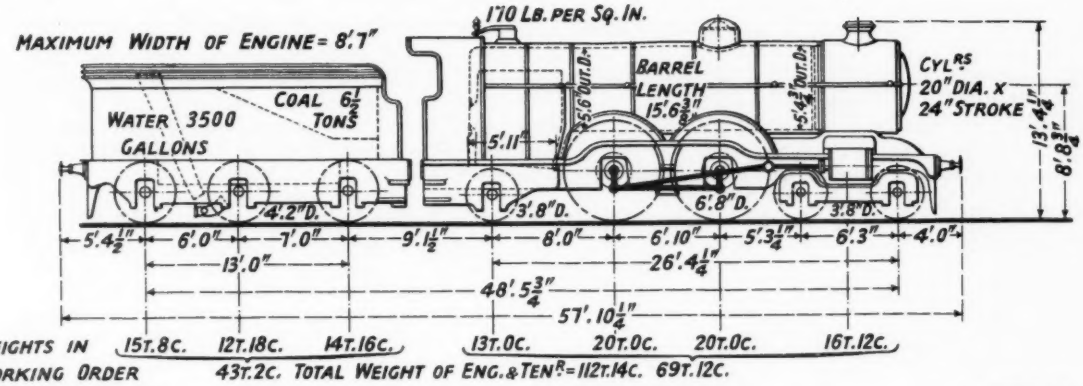
B.3 Class



HEATING SURFACE, TUBES—		SUPERHEATER	315·0 SQ. FT.
LARGE AND SMALL	1,405·0 SQ. FT.	COMBINED HEATING SURFACES	1,874·0 ,,
FIREBOX	154·0 ,,	GRATE AREA	31·0 ,,
TOTAL (EVAPORATIVE)	1,559·0 ,,	TRACTIVE EFFORT (AT 85 PER CENT. B.P.)	21,969·0 LB.

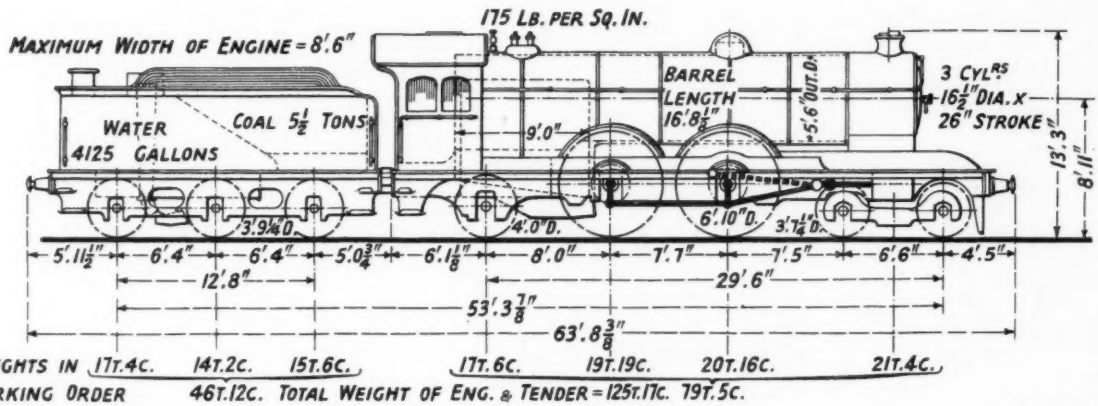
B.12 Class

London & North Eastern Railway



HEATING SURFACE, TUBES—		SUPERHEATER	427·0 SQ. FT.
LARGE AND SMALL	1,882·0 SQ. FT.	COMBINED HEATING SURFACES	2,450·0 ,,
FIREBOX	141·0 ,,	GRATE AREA	31·0 ,,
TOTAL (EVAPORATIVE)	2,023·0 ,,	TRACTIVE EFFORT (AT 85 PER CENT. B.P.)	17,340·0 LB.

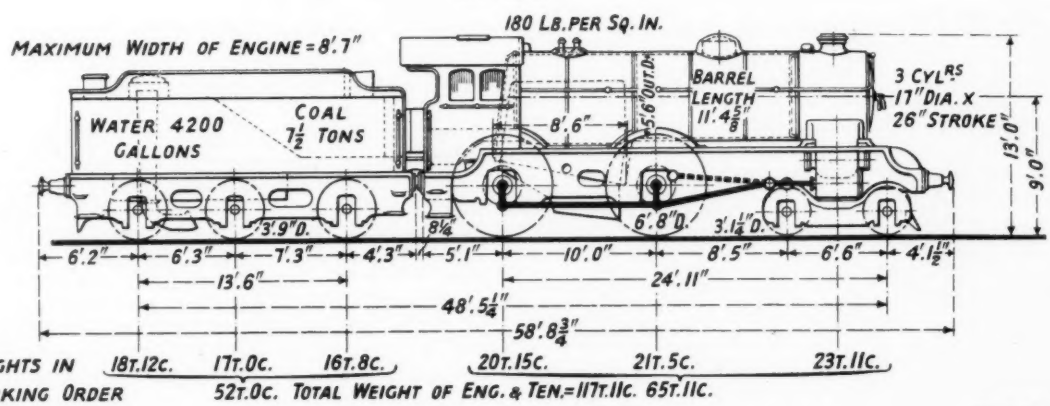
C.1 Class



HEATING SURFACE, TUBES—		SUPERHEATER	437·0* SQ. FT.
LARGE AND SMALL	1,672.5 SQ. FT.	COMBINED HEATING SURFACES	2,294·5 ,,
FIREBOX	185·0 ,,	GRATE AREA	27·0 ,,
TOTAL (EVAPORATIVE)	1,857·5 ,,	TRACTIVE EFFORT (AT 85 PER CENT. B.P.)	19,300·0 LB.

* *In some of these engines the superheater surface is 392 sq. ft., making the combined heating surfaces 2,249·5 sq. ft.*

C.7 Class



HEATING SURFACE, TUBES—		SUPERHEATER	271·8 SQ. FT.
LARGE AND SMALL	1,226·28 SQ. FT.	COMBINED HEATING SURFACES	1,669·58 ,,
FIREBOX	171·5 ,,	GRATE AREA	26·0 ,,
TOTAL (EVAPORATIVE)	1,397·78 ,,	TRACTIVE EFFORT (AT 85 PER CENT. B.P.)	21,556·0 LB.

D 19 Class

LOCOMOTIVE BOILERS

(*From a Correspondent*)

THE new boiler recently fitted by Mr. Maunsell to one of the "Lord Nelson" class locomotives, *Lord Howe*, presents in certain respects, notably in the size and design of the firebox, a novel departure from conventional practice, for not only is the firebox heating surface large for the type of engine, but the ratio of proportion between the heating surface and the grate differs considerably from average practice.

When compared with the original boiler, there is shown an increase in firebox heating surface of from 194 to no less than 246 sq. ft., representing an increase of 27 per cent. Further, as the grate area remains the same at 33 sq. ft., the firebox-heating-surface/grate-area ratio is raised from 5·88 to the high figure of 7·45, and while the relationship between these values does not exactly express the relative volume/grate-area ratios, a considerably larger firebox volume is indicated. This large increase in firebox capacity is attained by extending it forward into the barrel in the form of a combustion chamber a sufficient distance to reduce the length between the tube plates from 14 ft. 2 in. to 13 ft. 9 in. In the new boiler, the firebox now contributes 10·6 per cent. of the combined heating surfaces against 8·2 per cent. originally.

There has been rather a marked tendency recently towards an increase in firebox heating surfaces relative to the grate area. This is seen in the design of many modern boilers where the firebox tube plate has been pushed forward, thus adding to the heating surface and to the volume between the tube plate and the arch. Even so, however, the heating-surface/grate-area ratios do not exceed about 6; for instance, the "Royal Scot" class engines have a ratio of 6·06, and for other L.M.S. 4-6-0 engines with the latest taper boilers, the ratio adopted is 5·83 for the three-cylinder engines, and 5·97 for those having two cylinders. For the G.W.R. "Kings" the heating-surface/grate ratio is 5·62, but in the case of these engines the tube plate is of the usual vertical design which is standard practice. Considering larger engines, in the L.N.E.R. Pacifics, which have a modified form of combustion chamber, the heating-surface/grate ratio is 5·21; or the Mikado type, with 50 sq. ft. of grate, this figure is 4·75; while for the L.M.S. Pacifics with boilers of the latest design, the ratio adopted is not greatly different, being 4·82.

Turning to practice in the United States where combustion chambers are very common, and often, moreover, reach considerable proportions, the heating surface allowed for each square foot of grate is 5·71 in the case of the Pennsylvania Mountain type engines, Class M.1.a., which are notable as having combustion chambers 8 ft. long; while for the K.4.s. Pacifics, the ratio is 4·38, the grate areas being 69·9 and 69·8 sq. ft. respectively.

Reverting now to Mr. Maunsell's new boiler, the effect that this large increase in the firebox heating surfaces relative to grate will have on the boiler steaming capacity will be interesting information, for at present we have little or no absolute knowledge as to the advantages or otherwise of a relatively large firebox heating surface and volume in proportion to the grate area. It is true that combustion chamber volume is considered important in the case of modern boilers now used in stationary power plants, but it is uncertain whether the same considerations can be said to hold in the case of the firebox of the locomotive boiler with its large water contact surfaces.

In general an increase in firebox heating surface relative to the area of the grate will reduce the firebox temperature. There will be a greater evaporation by the firebox, but, due to the fall in temperature, the evaporation per sq. ft. of heating surface will be less. Further, as the temperature of the gases liberated by the firebox will be reduced, the heat offered to the tubes and flues will be less.

From a study of modern boiler proportions, it would appear that designers as a rule prefer not to overload the firebox with heating surfaces. In the writer's opinion, boiler steaming capacity is measured by the grate area, and is but little affected by the extent of the heating surfaces or by their distribution. On the other hand, there is no denying the fact that boiler efficiency is practically governed by the efficiency of the combustion process, and this consideration makes Mr. Maunsell's new boiler an interesting departure from normal practice and one from which some important information may be forthcoming.

Novel Methods of Strengthening Trestle Viaducts

Ten steel trestle viaducts on the Surf-Santa Barbara section of the San Francisco-Los Angeles Pacific Coast line of the Southern Pacific system have recently been strengthened in an unusual manner. They are from 400 ft. to 800 ft. in length, their maximum heights vary from 60 ft. to 95 ft. and they originally consisted uniformly of 60 ft. plate girder spans supported on trestle bents spaced longitudinally at 30 ft. centres. Both the girders and the high bents became weak for modern traffic and the method adopted was to support the centres of the 60 ft. spans with additional bents, each new bent being braced to the old tower on one side of it, a measure which as well as lessening the bending moments of the girder spans, reduced the reactions on the original trestles. Also the lacing bars on the outside faces of the tower posts were replaced by cover plates, cover plates were applied to the girder bottom flanges and two additional flange angles were fixed below the top flange angles of the 30 ft. girders.

The cover plating and flange angles were fixed by riveting, but as the latter members necessitated the cutting away of the tops of the vertical stiffener angles, it was necessary to weld the cut ends of the stiffeners to the outstanding legs of the new flange angles and to weld short stiffeners between the old and new flange angles. The same general principle was applied to the fixing of the cover plates on the columns. These were cut short, but positive bearing was provided at each end by filling the gap with weld metal after the plates were riveted in place. Abnormally elaborate scaffolding was used for the work and was moved successively from viaduct to viaduct. The safety of the men was specially guarded and whenever working without staging they were required to wear safety belts and tie ropes.

LÜBECK-BÜCHEN RAILWAY DOUBLE ARTICULATED TRAINS

Particulars of performance and extension of the service

IN the issues of THE RAILWAY GAZETTE dated January 31, and May 22, 1936, illustrated particulars were given of the streamlined tank locomotives built for the Lübeck-Büchen Railway by Henschel & Sohn A.G., Kassel, and the double-deck articulated coaches used in conjunction therewith for dealing with the fast passenger service between Hamburg, Lübeck, and Travemünde. We can now give particulars of the performance of these units in service. The original locomotives have proved capable of keeping to schedule with two single articulated coach sets, carrying a total of 600 passengers, and as explained later, a third locomotive has been ordered with larger boiler and increased water capacity, to meet the requirements of working under easier conditions with a train of twice the capacity.

The basic requirements governing the design of the single articulated coach trains were: Reversible, or push-pull operation at a maximum speed of 120 km. (74·6 m.) p.h. in either direction of running, and sufficient coal and water capacity for the double journey, Hamburg—Travemünde—Hamburg. With a single articulated coach set weighing 71 metric tons (69 tons 17 cwt.) and a tank locomotive weighing 69 metric tons (67 tons 18 cwt.) in running order, the deadweight a passenger is 467 kg. (about 1,030 lb.), compared with 793 kg. (1,748 lb.) a passenger for a train of four eight-wheeled corridor coaches (totalling 148 metric tons or 145 tons 13 cwt.) hauled by a 2-4-4 locomotive weighing 90 metric tons (88 tons 11 cwt.) in running order. This comparison shows that the new construction saves about 40 per cent. in deadweight per passenger carried, a saving which increases to about 55 per cent. when working with two articulated sets.

Tractive resistance is reduced by streamlining and by the use of roller bearings in the coach axles. The tractive effort for a speed of 120 km. (74·6 m.) p.h. is 1,430 kg. (3,152 lb.), corresponding to about 540 h.p. The water consumption for the double journey on the above-mentioned schedule is 7.5 cu. m. (1,650 gallons) and the coal consumption 1 22 metric tons (1 ton 4 cwt.), or much less than the tank and bunker capacity (2,046 gallons and 3 tons 9 cwt. respectively). The saving in fuel consumption compared with a train of four corridor coaches hauled by a more powerful tank locomotive on the same schedule, is about 40 per cent.

The leading dimensions of the locomotive are as given in our article (January 31, 1936), and the following particulars supplement our earlier information. The superheater, of the Schmidt type, comprises 24 elements of 24/30 mm. (0·945/1·181 in.) tube diameter, and 26 sq. m. (280 sq. ft.) surface, delivering steam at 380-400° C. (716-752° F.). The plate frames are 18 mm. (about $\frac{11}{16}$ in.) in thickness, and with the exception of the bolted-on buffer beams, all the frame and bracing connections are welded. The two single-expansion cylinders are fitted with Henschel-Trofinoff piston valves of 220 mm. ($8\frac{5}{8}$ in.) diameter. In the interests of smooth running, the whole of the motion work is of specially lightened construction. Cylinders, piston valves and glands are lubricated by a De Limon pump with 14 feeds; a sight-feed fitting is provided.

Heusinger valve gear is fitted, and remote control of the regulator, from the leading end of the train when running with the locomotive behind, is as explained in the previous article, by an electric motor and chain drive for opening, and by an electromagnetically controlled compressed air cylinder for closing. A loud speaker and bell equipment provides for communication between driver and fireman. The remote control gear was supplied by the firm of H. Becker, Berlin-Reinickendorf. All wheels are braked on both sides by a Knorr compressed air brake with supplementary braking. Hand braking is also provided. The braking distance is about 700 m. (765 yd.) from 120 km. (74·6 m.) p.h. to standstill. Compressed air sanding gear is fitted for both directions of running, and other features of the equipment include steam heating, Deuta speed indicator, and a 500-watt type DRB turbo-generator for electric lighting of the track, cab, fittings, and motion work.

The heavy seaside traffic and the popularity of the double-deck coaches led to trials of trains of two articulated coaches, accommodating 600 passengers. The original locomotives proved capable of maintaining the schedule with the double load, but, as already mentioned, it was clearly desirable to have an increased boiler heating surface and greater water capacity. To this end, a third locomotive, now on order, is to have a boiler of greater diameter with a heating surface of 86 sq. m. (925·4 sq. ft.); a grate area of 1·6 sq. m. (17·2 sq. ft.); and a water tank capacity of 11·5 cu. m. (2,530 gallons). The motion work, the outside dimensions, and the general appearance of the locomotive will remain as before. The weight in running order will be about 74 metric tons (72 tons 16 cwt.) and the loading of the coupled axles 20 metric tons (19 tons 13 cwt.). The deadweight for each passenger seated will then be only 360 kg. (794 lb.). Specially notable features of these trains are the high speed of reversible (push-pull) operation, and the successful use of simple bissels at this speed.

Activities of the German Signal Industry

A recent publication gives some interesting details of work done by the V.E.S. signal works, an amalgamation formed in 1928 of several firms, such as Jüdel, Stahmer, and the Bruchsal works, with the signal departments of large electrical concerns like Siemens and the A.E.G., the combined factories now employing about 3,500 hands. The Bruchsal works were founded by Schnabel and Henning in 1869, the Jüdel works in 1871. Siemens and Halske started making railway signalling devices in 1855 and introduced all-electric power working in Germany in 1896. Of the 15,000 mechanical locking frames in use on the Reichsbahn today, over 12,000 have come from the V.E.S. or its constituents, which have made altogether over 18,000 mechanical, and over 2,500 power signalling installations, 500 of the latter for foreign countries. Of the well-known Frischen, or S. & H., block apparatus, 30,000 sets have been provided, with over 250,000 electric locking units; this apparatus is not only standard in Germany, but widely used in several other countries also. Of recent years automatic block and gravity yard appliances, level crossing warnings, cab signals, automatic train control and train stops, and axle counting apparatus have been developed, and many important installations made, the "Flying Hamburger" service being equipped with inductive train control, with vigilance handle, speed control and absolute stop features.

NEW ROLLING STOCK FOR C.L.C. LIVERPOOL-MANCHESTER SERVICE

Three sets of new articulated non-corridor stock are being introduced for this fast inter-city service

(*See illustrations on page* 760)

WITH a view to improving the standard of comfort, especially on the important Liverpool—Manchester services, the Cheshire Lines Committee has ordered three new trains, the first of which has recently been put into service. The trains are to the design of Sir Nigel Gresley, Chief Mechanical Engineer, L.N.E.R., and have been constructed by Cravens Railway Carriage & Wagon Co. Ltd., Sheffield.

Each train comprises four twin articulated vehicles; each body is 51 ft. 1½ in. long, the total length of train 427 ft. 1½ in., and the total tare weight 192 tons. Seating is provided for 40 first class and 468 third class passengers, and lavatory accommodation is located in the composite vehicles in the middle of the train. The bodies are constructed of teak and are mounted on steel underframes; the bogies are of the compound bolster type as standardised on the L.N.E.R. The carriages are electrically lighted and are fitted with magnetic switches to enable the guard to control the lights throughout the train. The trains are fitted with vacuum brakes and steam heating apparatus is also provided in each compartment. The exteriors of the vehicles are finished in varnished teak.

The first class seats, which are provided with double spring cushions, are upholstered in an attractive moquette, and the partitions, ceilings, and mouldings are covered in Rexine. The portion immediately above the seat backs is of a delicate grey colour, whilst the upper portions of the partitions and the ceiling are of ivory. The provision of chromium-plated metallic fittings completes the modern note in the decoration. The third class compartments are upholstered in brown moquette, and the walls and ceilings are provided with a Rexine finish, the lower portion of a brown mottled shade, and the ceiling and upper portions cream. Mirrors are provided in all compartments.

The lavatories, which are provided with hot and cold water, are also decorated in Rexine. In the first class lavatories the walls above the waist are covered with a biscuit coloured Rexine, whilst below the waist the Rexine is of a slightly darker shade. The third class lavatories are covered in grey stippled Rexine above and blue below the waist.

On Friday, April 9, the first of these trains was given a trial run from Manchester Central to Liverpool Central, with intermediate stops at Warrington and Farnworth. Before leaving Manchester, Mr. G. Leedam, Manager and Secretary, Cheshire Lines Committee, received the official guests and gave them the opportunity of inspecting the new stock. The Lord Mayor of Manchester was prevented from being present by an engagement in London, and his place was taken by Sir Norton Barclay, Chairman of the Manchester and District Bank; other important guests included:—

Sir Christopher Thomas Needham, Director, L.N.E.R., Colonel Stevens, Chairman of the Trafford Park Estate Company, Sir William Himbury, President of the Manchester Cotton Exchange, and Messrs Clucas and Kissane, respectively President of the Chamber of Commerce and Secretary of the Manchester Ship Canal.

Included in the party were:—

Mr. W. Shuttleworth, Operating Assistant to the Manager of the C.L.C.; Mr. F. Hughes, Secretarial Assistant; Mr. W. A. English, Commercial Assistant; Mr. Harold Craven; Messrs. Kirk and Widdowson, respectively District Locomotive Superintendent. Gorton, L.N.E.R., and Stationmaster, Manchester, C.L.C., and Mr. R. W. Royle, Managing Director of the C.W.S., Manchester.

Leaving Manchester at 12 noon, the train covered the 15·7 miles to Warrington in 16 min. 55 sec., a time which, but for relaying operations at Padgate Junction, involving a slack to 15 m.p.h. in place of the normal 35, could easily have been cut to 16 min.—2 min. less than the standard schedule of the Manchester—Liverpool expresses; "Sandringham" class locomotive, No. 2824 (Driver E. A. Calvert, of Gorton shed), hauled the train, which, with an extra vehicle, weighed 220 tons gross, and a maximum speed of 80½ m.p.h. was touched before the Padgate Junction slack, the average over the 10·7 miles between Trafford Park and Padgate being 73 m.p.h.

At Warrington, where there was a stop of 40 min., Mr. Leedan received the Mayor, Town Clerk, and Chief Constable and also important traders from the locality; after the Mayor and Town Clerk had referred appreciatively to the enterprise of the C.L.C. in providing still better services and to the excellence of the rolling-stock both in appearance and comfort, toasts were drunk, which were suitably acknowledged by Mr. Leedam and Mr. Harold Craven, Managing Director of Cravens Railway Carriage & Wagon Co. Ltd.

A short run to Farnworth followed, the 6·1 miles being covered smartly in 8½ min. start to stop, and here the Mayor and Mayoress of Widnes, the President of the Widnes Chamber of Commerce and various chiefs of important firms were conducted over the train.

Over the final stretch to Liverpool, traffic exigencies prevented the realisation of fast running, but the train drew in at its booked time of 2.0 p.m., and at 2.30 p.m. there was a reception by the Lord Mayor of Liverpool, who was accompanied by Mr. Frederick Liddell Steel, Director of the L.N.E.R. and C.L.C., Mr. A. Harold Bibby, D.S.O., Director of the L.N.E.R., Sir Lionel Warner, Secretary and General Manager, Mersey Docks and Harbour Board, Mr. W. L. Box, Manager and Engineer of the Liverpool Overhead Railway, Mr. T. G. Brew, Secretary, Liverpool & N. Wales Steamship Company, and by many other prominent Merseyside industrialists.

The first train entered into regular service on Monday, April 12, being utilised on three double trips daily between Manchester and Liverpool; the second train will be ready at the end of April and the third in September, by which time it will be possible to eliminate all out-of-date rolling stock from this important inter-urban service in its entirety. This should strengthen the cordial relations existing between traders and the Cheshire Lines Committee, no better proof of which can be afforded than the fact that already 75 per cent. of passengers travelling between Manchester and Liverpool use the C.L.C. line.

The following is a list of sub-contractors:—

Slater, Birds & Co.: Teak.
Docker Bros.: Varnish.
A. G. Wild & Co. Ltd.: Steam Heating.
J. Holdsworth & Co. Ltd.: Moquette.
Firth & Co. Ltd.: Seat Springs.
Jones & Foster Limited: Metallic Fittings.
Linley Engineering Co. Ltd.: Parcel Racks.
A. G. Wild & Co. Ltd.: Parcel Racks.
J. Levick & Co.: Lavatory Fittings.
Pilkington Bros.: Mirrors.
Laycock Engineering Co. Ltd.: Blinds.
J. Kaye & Sons Ltd.: Locks.
Triplex Safety Glass Co. Ltd.: Triplex Glass.
W. M. Still & Co. Ltd.: Hot Water Heater.
Carpet Trades Co.: Wilton Rugs.

REORGANISATION OF THE MOTIVE POWER DEPARTMENT OF THE L.M.S.R.—I

A far-reaching scheme of modernisation applied to the main and subsidiary locomotive depots of the company, which has led to considerable reduction in engine stock and economies in time and labour with corresponding financial gain

ON its formation in 1923 under the system of British railway grouping then introduced, the London Midland & Scottish Railway absorbed 35 constituent and subsidiary companies, together with their departmental standards covering every aspect of railway activity. Problems of an outstandingly complex description naturally followed, the solution of which could be achieved only by far reaching methods involving schemes of reorganisation on a wide scale. On the present occasion we are concerned with the locomotive aspect alone, and in specific relation to the more intensive utilisation of engine power for operating purposes. It will, of course, be appreciated, that other departmental activities are interwoven with the subject, and whilst their influence is by no means negligible, they can for the present purpose be left out of consideration.

The L.M.S.R. Company's stock of locomotives at the end of 1936 was 7,691, and in the period from 1923 to 1936 the company expended £16,000,000 on new and improved locomotives. The number of types of engines has since that time been considerably reduced, i.e., from 393 at the beginning of January, 1923, to 173 at the end of 1936, and a further reduction, to 136, will have been effected when the 1937 programme has been completed. This reduction is, of course, very important from the point of view of standardisation of design and tractive force, coupled with the elimination of a considerable variety of spare parts. Much has likewise been accomplished in the direction of concentration and speeding up of heavy repairs in the shops, and in this connection full details of the modernised methods at Crewe and Derby have already been dealt with in our pages.

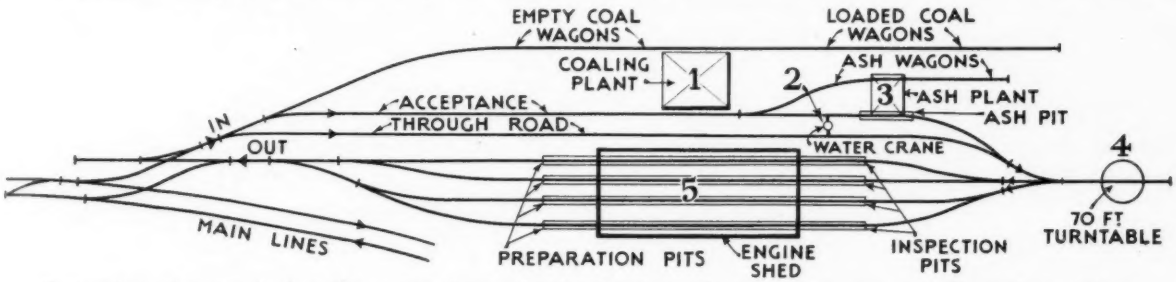
A leading problem in all departments after the amalgamation had taken place was that of standardisation, and active steps were taken to substitute planned methods for the indiscriminate variety of practice then existing. The varying types of passenger stations, goods sheds, and locomotive depots to be found on railways are more often than not a legacy from a period when the enormous future development of railway transportation was not foreseen; it is, therefore, easy to understand how inadequate and unsuitable were many of the L.M.S.R. locomotive depots after grouping. The problem confronting every executive officer of the company and, indeed. every operating manager or superintendent of motive power, was how to use the locomotives to their fullest extent and thereby justify the enormous amount of money expended on this prime mover of transport, and, moreover, to work efficiently an annual mileage of approximately 230,000,000 involving an expenditure of £12,000,000 in locomotive running expenses.

The figures just quoted, added to the statements preceding them, make it abundantly clear that here was a problem of considerable magnitude, requiring the most energetic and specific treatment in its solution. The method of attack was planned on lines based on a definite formula, namely that of: —

(1) Obtaining greater operating efficiency, and increased reliability and availability of engines.
(2) Eliminating lost motion, wasteful energy, and delay.
(3) Bringing the work to the men instead of taking the men to the work.
(4) Reducing the physical effort of the men.

The achievement of these benefits was to be, and, indeed, has been, obtained through the processes of:—

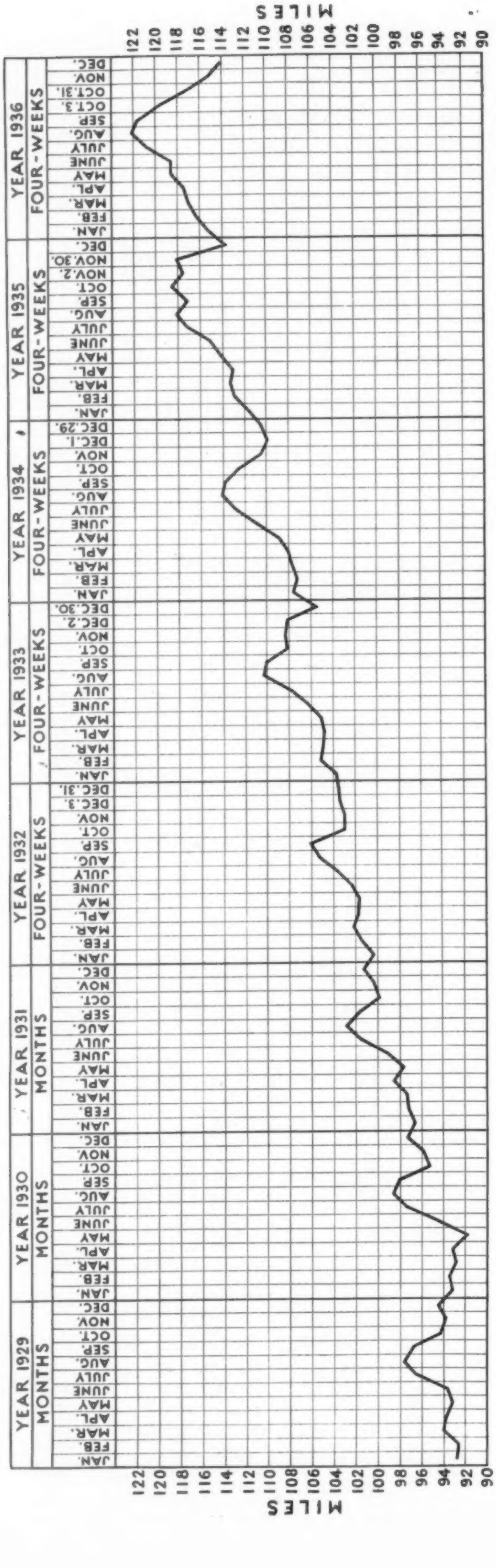
(*a*) Analysing all operations.
(*b*) Improved yard and shed layouts, and the introduction of a planned system which ensures a natural sequence of operations with a minimum of time for—
(i) Coaling and watering, simultaneously, if possible. } By utilising mechanical appliances.
(ii) Ashpit work. }
(iii) Turning.
(iv) Stabling in shed or return to preparation pits for further duty.
(*c*) Greater technical efficiency and competitive personal emulation towards reducing casualties.
(*d*) Provision of modern machines for running repairs.
(*e*) Equipment of all engine turntables with vacuum-operated tractors to displace manual effort.
(*f*) Introduction of the area supply repair concentration and garage scheme for examination and repairs.



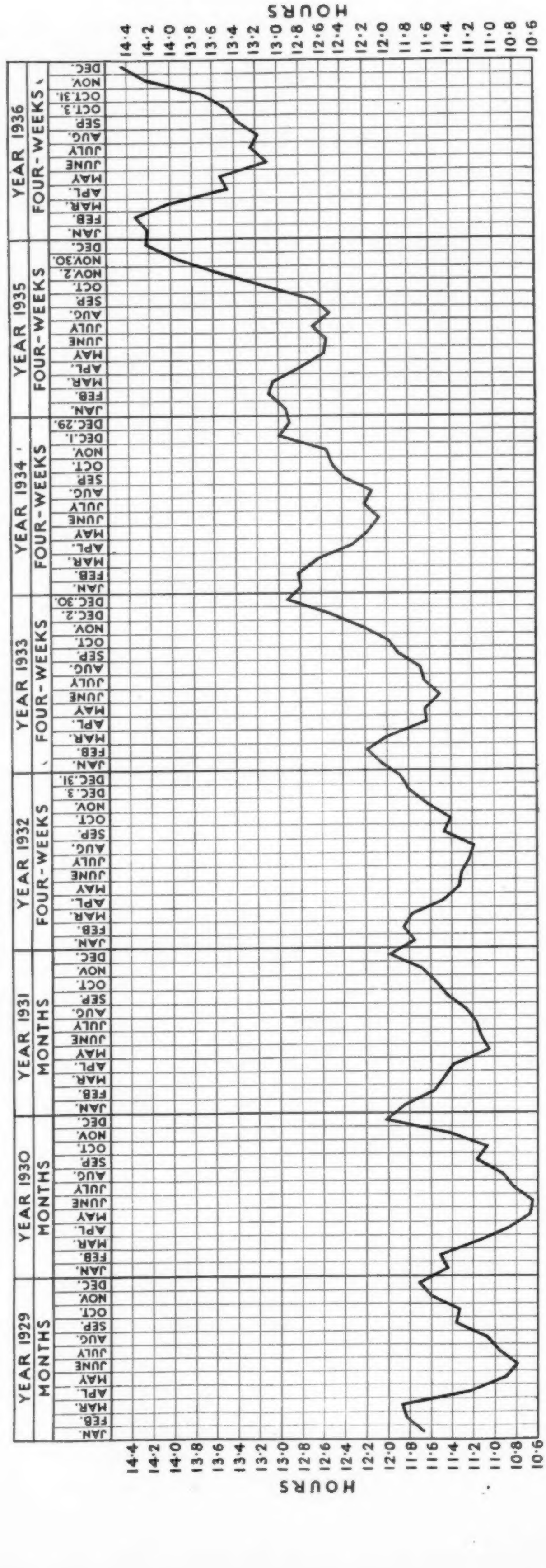
Basic plan of reorganised motive power depot, showing locations of plant and sequence of disposal operations

Inception of the Scheme

Starting from the point when a locomotive is turned off the shed ready for service, the question that arose was how the maximum amount of work could be obtained from an engine during every twenty-four hours. Practice in the past appeared to have been based on the assumption that the engine rosters constituted the final word, and what had to be determined was how waste could be discovered and so far as possible prevented. The following table



Graph showing engine miles per day per engine in use, 1929—1936



Graph showing engine hours in traffic per day per engine in use, 1929-1936

TABLE A—LINE ANALYSIS OF LOCOMOTIVE TIME—WITH ACTUAL RESULTS OF ANALYSIS TAKEN AT SIX SHEDS FOR WEEK ENDING FEBRUARY 25, 1933

Shed	Engine hours (shed to shed)			At locomotive shed																At or waiting loco. repair shops		Waiting C.M.E. boiler inspection
	Working trains or assisting (required)	Shunting	Margins between trips in traffic: Marginal time between shed and station or depot	Margins between trips in traffic: Known loco. requirements	Margins between trips in traffic: Traffic	Time running light (other than col. 7, eng. and bk.) or assisting (not required)	Preparation time	Disposal time	Available time: Steam being raised	Available time: Other	Washing out: Waiting period	Washing out: Time from emptying to refilling boiler	Running repairs: Waiting: Staff not available	Running repairs: Waiting: For material	Running repairs: Time occupied	Periodical examination: Waiting period	Periodical examination: Time occupied	Waiting shops or waiting C.M.E. decision	At shops	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
"A" (freight), 84 engines ..	4 2	4 6	0 34	0 3	0 57	0 37	0 53	1 15	2 32	2 38	0 35	0 11	2 13	0 14	0 48	0 26	0 10	—	1 46	0 9
"B" (passenger), 76 engines ..	4 24	3 28	0 42	0 7	1 6	0 10	0 44	1 7	2 47	5 14	0 19	0 12	1 14	0 16	0 48	0 21	0 15	—	0 37	—
"C" (passenger and freight), 35 engines ..	4 25	1 39	0 30	0 2	2 18	0 13	0 49	1 26	1 59	3 41	0 3	0 9	2 3	1 27	1 29	0 1	0 8	0 50	0 48	—
"D" (passenger and freight), 60 engines ..	4 10	4 6	0 54	0 5	0 11	0 17	0 48	1 45	2 34	3 21	0 21	0 16	1 23	0 13	1 4	0 15	0 10	0 48	1 19	—
"E" (passenger and freight), 44 engines ..	4 18	2 43	0 27	0 5	1 39	0 11	0 43	0 47	2 19	4 12	0 13	0 14	3 14	0 24	1 0	0 26	0 5	—	1 0	—
"F" (freight), 128 engines ..	4 44	4 55	0 36	—	0 13	0 16	0 42	0 52	2 33	3 5	0 6	0 23	1 43	0 56	0 43	0 20	0 23	0 14	1 11	0 5
Average of six sheds	4 23	3 54	0 38	0 3	0 5^	0 18	0 46	1 9	2 31	3 35	0 17	0 16	1 52	0 33	0 54	0 20	0 14	0 15	1 10	0 2

Graph showing engine hours in traffic per day per engine in use, 1929-1936

represents a line analysis of locomotive time with actual results of analyses taken at six sheds.

A motion study was made of all the work performed at six representative sheds each day for a week, as a result of which it was found that out of the twenty-four hours the average time occupied in actually working or assisting trains was 4 hr. 23 min. This provided the background for investigation, it being realised that here were potentialities of waste to be tapped by an examination of the conditions at all locomotive sheds, as it was considered that schemes of modernisation would lead to greater efficiency combined with economy by increasing the daily user of locomotives for traffic purposes. This higher standard of operating efficiency could, it was felt, be obtained by:—

(1) Improving the layout of the yard and shed to give greater freedom of engine movements.
(2) The installation of mechanical coaling and ash disposal plants.

In connection with (1) it was quickly discovered that the layout of the yard had an enormous influence on the amount of time spent either before or after the engine was in traffic, and this will be the more readily appreciated when it is stated that at one shed six hours were required in which to complete the disposal duties of an individual engine. One of the principles laid down was that the disposal of an engine should be in forward movements from the time it entered the locomotive yard until it arrived at the road on which it was to be stabled, or had left the shed yard again for traffic purposes. In order to carry this out, the operations were scheduled in the following order:—

(1) Coaling.
(2) Watering.
(3) Ashpit—cleaning fires, ashpans, and smokeboxes.
(4) Turning.
(5) Stabling in shed or return to preparation pits for other duty.

Existing manual methods of coaling and ashpit work would not, of course, achieve the desired result, and it therefore became necessary to instal mechanical appliances to enable these operations to be carried out in the minimum time. The diagram drawing on page 749 represents the ideal layout worked to in reorganising the locomotive depots; it shows the sequence of disposal operations following the definite order in which duties were to be carried out. This ideal layout has been adopted as a standard, but it is capable of adjustment to particular physical conditions where space is restricted, or other factors prevent its adoption. The effect of such a layout is that an engine can complete the necessary disposal operations within an hour instead of two or three hours as previously was the case. Also, one of the primary conditions in adopting the scheme of modernisation was that physical effort on the part of the staff should be reduced; in other words to substitute scientific methods for manual labour. More ready disposal of engines obviously makes available greater margins of locomotive power for further utilisation, which in turn exerts an influence on the stock of locomotives required to carry the traffic.

Original Modernisation Schemes

The first schemes of modernisation were approved in 1933, and since that date no fewer than 47 schemes have been authorised by the L.M.S.R. Board, of which 39 have already been completed. The expenditure so far involved has amounted to £750,000, and the benefit to the company has proved to be of a substantial order. The increase in mobility afforded has enabled greater use to be made of locomotives for traffic purposes, and the graphs reproduced opposite illustrate the increase in the number of

miles and hours per day per engine in use over the last four years.

The miles and hours per day per engine in use are represented as follow:—

Year	Engine miles	Hours
1929	94·60	11·37
1930	95·18	11·15
1931	99·54	11·47
1932	102·76	11·54
1933	106·77	11·99
1934	110·48	12·51
1935	115·58	13·08
1936	118·14	13·74

A useful supplement to the foregoing is the table appearing below, which covers the period 1929 to 1936 and shows, on a percentage basis, the improvements effected during that time. This includes figures tabulated under several different headings applying both to passenger and freight train services, and indicates very clearly what it is possible to achieve by methodical systems of investigation and control.

From the point of view of stock of locomotives the following figures are illuminating:—

Year	Number of steam locomotives
December 31, 1933	8,226
,, ,, 1934	8,004
,, ,, 1935	7,894
,, ,, 1936	7,691

From January 1, 1923, to December 31, 1936, the engine stock was reduced by 2,705, and since the beginning of 1934 no fewer than 538 locomotives have been broken up without replacement, much of this being the outcome of modernised shed operation.

Increased Availability of Engines

The foregoing sufficiently indicates the improvements which have resulted from the scheme of modernisation adopted, and when the whole of the depots scheduled for treatment have been remodelled there should, and, it seems safe to say, certainly will, be a further increase in the amount of locomotive availability. The final link in the chain will be the absorption of that additional availability into diagrammed engine workings and lengthened engine runs for revenue earning purposes. The problem of obtaining increased availability is not confined to locomotives only, but is inherent in all forms of transport—in the air, on the sea and on the road. This is exemplified by the fact that companies operating air services try to keep their machines in the air for the maximum time to achieve economical operation, whilst steamship companies strive for a quicker turn-round at the end of each voyage to obtain a greater number of trips. Road hauliers, in their turn, endeavour to get full return loads to remunerate their vehicles, with the elimination of empty or light mileage. Railway wagons and carriages are controlled and regulated with the object of effecting a more intensive use.

Another factor having an important bearing on the amount of time an engine is available for traffic purposes is the extent to which it is stopped for repairs, both at shops and running depots. The shop problem has already

TABLE B—L.M.S.R. OPERATING UNITS IN RELATION TO THE YEAR 1929 CONSIDERED AS 100

——	1929	1930	1931	1932	1933	1934	1935	1936	Percentage improvement in 1936 compared with 1929
1. Steam locomotives—									
Train-miles per train-hour									
Coaching	14·13	14·30	14·41	14·53	14·48	14·51	14·46	14·33	
	100	101·20	101·98	102·83	102·48	102·69	102·34	101·42	1·42
Freight	8·43	8·89	9·13	9·66	9·53	9·21	9·09	8·43	
	100	105·46	108·30	114·59	113·05	109·25	107·83	100·00	—
2. Assisting required mileage per 100 train-miles—									
Coaching	1·72	1·45	1·26	1·29	1·33	1·73	1·32	1·29	
	100	84·30	73·26	75·00	77·33	100·58	76·74	75·00	25·0
Freight	6·04	4·78	3·45	2·91	2·93	2·96	2·78	2·80	
	100	79·14	57·12	48·18	48·51	49·01	46·03	46·36	53·64
3. Shunting per 100 train-miles—									
Coaching	8·99	8·91	8·89	8·89	8·60	8·30	8·10	7·98	
	100	99·11	98·89	98·89	95·66	92·32	90·10	88·77	11·23
Freight	71·16	70·04	68·89	68·33	68·63	68·72	68·40	69·25	
	100	98·43	96·81	96·02	96·44	96·57	96·12	97·32	2·68
4. Wagon-miles per train-engine-hour (including assisting and light)	238·38	252·14	262·16	274·96	275·18	268·26	267·20	250·03	
	100	105·77	109·98	115·35	115·44	112·53	112·09	104·89	4·89
Per total engine hour	119·15	123·06	126·78	129·52	130·15	129·03	129·44	124·50	
	100	103·28	106·40	108·70	109·23	108·29	108·64	104·49	4·49
5. Engine-miles per day per locomotive in use—									
Weekdays	94·60	95·18	99·54	102·76	106·77	110·48	115·58	118·14	
	100	100·61	105·22	108·63	112·86	116·79	122·18	124·88	24·88
6. Coal consumed in lb. per engine-mile—									
Steam locomotives									
Coaching	53·02	51·61	51·32	51·22	51·48	51·50	51·49	52·10	
	100	97·34	96·79	96·61	97·10	97·13	97·11	98·26	1·74
Freight	61·82	61·17	61·68	61·16	61·21	60·92	60·45	60·65	
	100	98·95	99·77	98·93	99·01	98·54	97·78	98·11	1·89
7. Oil consumed in pints per 100 engine-miles—									
Steam locomotives	6·42	6·08	5·85	5·73	5·69	5·73	5·74	5·78	
	100	94·70	91·12	89·25	88·63	89·25	89·41	90·03	9·97

The figures relating to coal and oil consumption have been revised for each year, to bring them into line with new method adopted by Ministry of Transport from 1936, whereby coal consumed by purely shunting engines is not recorded separately, and oil consumed is not divided between coaching and freight.

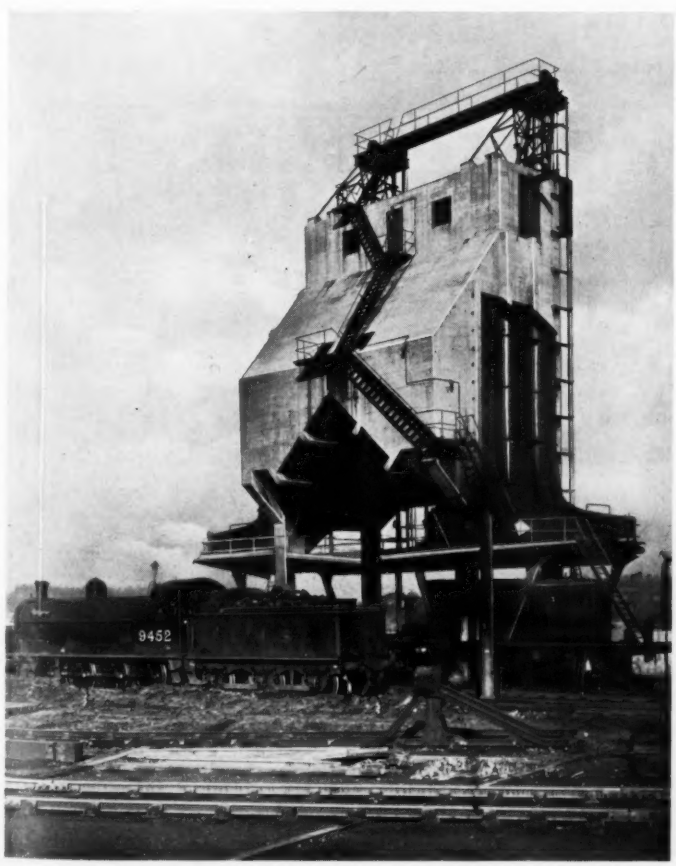
NOTE.—The unfavourable results for 1936 under items 1 and 4 were due to abnormal climatic conditions during January–February, and November–December.

been dealt with in previous articles, but the methods of dealing with the repairs at running sheds provided scope for much improvement and were consequently taken in hand.

The Scheme in Detail

The organisation introduced on the L.M.S.R. is known as the "Motive Power Area Locomotive Supply, Repair Concentration, and Garage Scheme." In accordance with it, the line has been divided into 29 areas, *i.e.*, 26 in England and Wales and 3 in Scotland. Each area is in charge of a District Locomotive Superintendent, and has one main or concentration depot and a number of sub or "garage" depots. The map reproduced as a folding plate indicates the location of the depots and their respective classifications. The boundaries of the areas were decided after careful consideration of the general flow of traffic, in order to obviate light mileage by engines running to and from the main depots for repairs. In order to bring about the co-operation desired between the motive power and operating sections, the motive power areas have been arranged to coincide with the district traffic control areas as far as possible, viz., one motive power area covers the whole of one or more district control areas, which means that in the majority of cases a district controller deals with only one district locomotive superintendent. This, in itself, leads to greater efficiency, and paves the way for the economic distribution of engine power in all areas to meet fluctuations of traffic.

One of the aims of the scheme is to allocate engines on an "area" basis, so that the area may be considered for working purposes as one large depot. When a number of specials has to be worked from a particular shed within an area, engines are drafted there from the main depot in the area. Similarly, when engines become due for major examinations, heavy running repairs, or shopping, the complement at the garages is maintained by the main depot. Thus, whilst each depot has its own complement of engines, the locomotive stock in the area is utilised to the best advantage, and a reduced number of engines is required to cover exigencies of traffic, repairs, and other contingencies. The major examinations and heavy running repairs are carried out to all the engines in a given area at the main or concentration depot.



New locomotive coaling plant at Rugby

Contractors for Plant

Illustrated particulars of the mechanical coaling and ash plants and other equipment will be given in succeeding issues. The following are the names of the firms which supplied the plant.

COALING PLANTS:—

Henry Lees & Co. Ltd.: 29 installations at Farnley, Longsight, Patricroft, Buxton, Stoke, Devons Road, Nuneaton, Saltley, Carlisle (Kingmoor), Derby, Peterborough, Inverness, Carstairs, Corkerhill, Lower Darwen, Bank Hall, Lostock Hall, Agecroft, Aintree, Perth, Goole, Rose Grove, Bolton, Bedford, Accrington, Stafford, Mold Junction, Camden, and Huddersfield.

Mitchell Engineering Limited: 9 installations at Aston, Monument Lane, Rugby, Newton Heath, Holyhead, Tilbury, Low Moor, Hasland, and Preston.

Babcock & Wilcox Limited: 1 installation at Springs Branch.

Wantage Engineering Co. Ltd.: 1 installation at Walsall.

Wellman Smith Owen Engineering Corporation Limited: 1 installation at Bescot.

Mavor & Coulson Limited: 1 installation at Stranraer.

R. Dempster & Sons Ltd.: 3 installations at Sheffield (Grimesthorpe), Nottingham, Leeds (Holbeck).

Royce Limited: 1 installation (coal crane) at Lancaster.

ASH PLANTS:—

R. Dempster & Sons Ltd.: 13 installations at Rugby, Monument Lane, Edge Hill, Farnley, Springs Branch, Devons Road, Newton Heath, Bank Hall, Lostock Hall, Accrington, Bedford, Preston, Nuneaton.

Henry Lees & Co. Ltd.: 10 installations at Buxton, Longsight, Corkerhill, Agecroft, Lower Darwen, Rose Grove, Bolton, Camden, Huddersfield, and Stafford.

Mitchell Engineering Limited: 1 installation at Aston.

Babcock & Wilcox Limited: 14 installations at Stoke, Derby, Leeds, Peterborough, Saltley, Grimesthorpe, Inverness, Carstairs, Carlisle (Kingmoor), Perth, Mold Junction, Aintree, Goole, and Low Moor.

M. B. Wild & Co. Ltd.: 4 installations at Patricroft, Bescot, Walsall, and Nottingham.

WATER COLUMNS:—

Newton Chambers Limited; Cowans, Sheldon & Co. Ltd.

WATER TANKS:—

Newton Chambers Limited; Stevensons Limited.

SUMP DRAINAGE PUMPS:—

Hamworthy Engineering Co. Ltd.; Bryan Donkin & Co. Ltd.; Jobson & Beckwith Limited.

TURNTABLES:—

Cowans, Sheldon & Co. Ltd.; Ransomes & Rapier Limited.

SAND DRYING PLANTS:—

R. Dempster & Sons Ltd.; Wantage Engineering Co. Ltd.

CAPSTANS:—

Cowans, Sheldon & Co. Ltd.

BOOSTER PUMPS:—

Frank Pearn & Co. Ltd.; The Harland Engineering Co. Ltd.

COMBINATION MACHINE TOOL:—

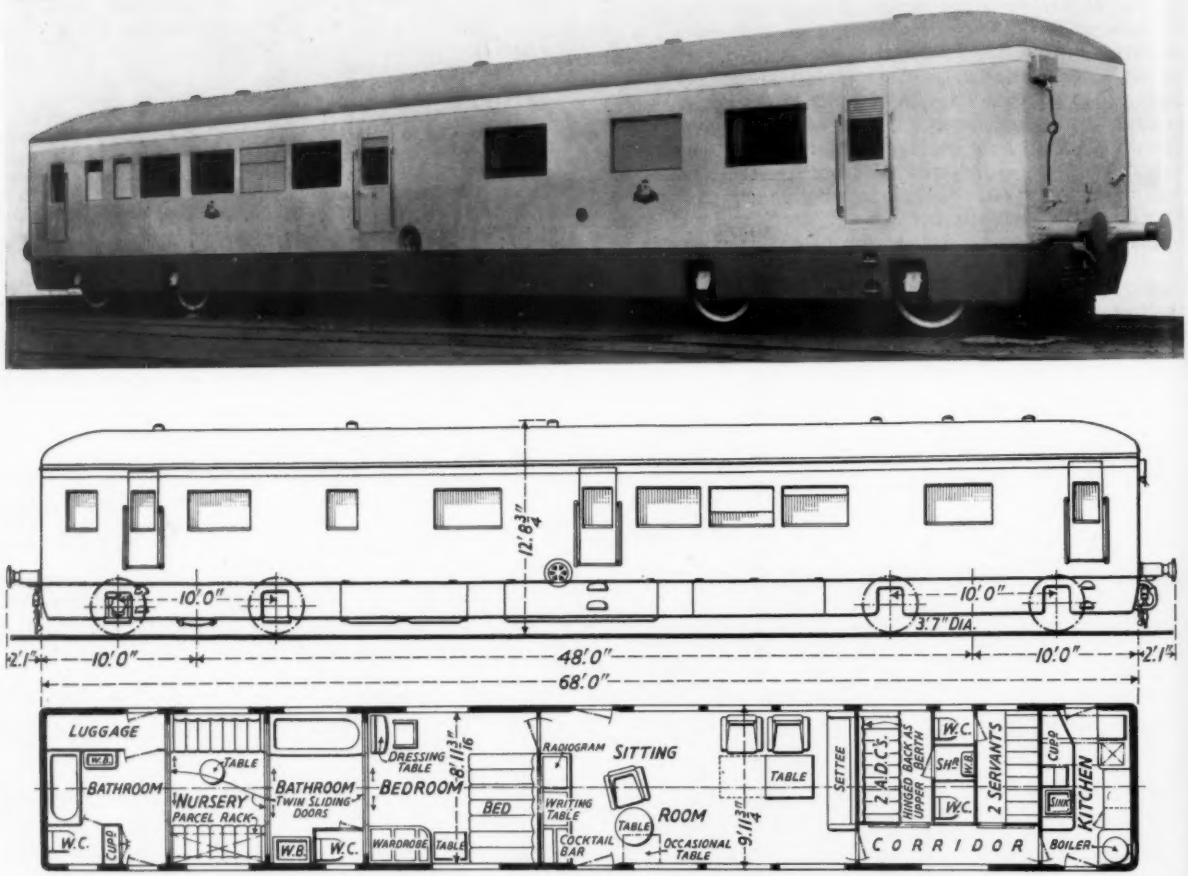
Kitchen & Wade Limited.

NEW SALOON COACH FOR H.H. THE MAHARAJA OF INDORE

An all-steel vehicle integrally built body and underframe. Elaborate interior equipment is provided

THE Gloucester Railway Carriage & Wagon Co. Ltd. has just completed a special family saloon coach for His Highness the Maharaja Holkar of Indore. The internal arrangements and decorative schemes have been worked out by Herr Muthesius, Architect to His Highness, and the Gloucester Railway Carriage & Wagon Company.

The coach is of all steel construction, including the inside panelling, and is carried on Indian Railway Standard bogies. The body is built integral with the underframe, the latter based on Indian Railway Standards but modified to suit the structure, the standard trussing being, of course, omitted. As will be noticed from the plan drawing repro-



Exterior view, dimensions, and interior arrangements of new saloon coach supplied by the Gloucester Railway Carriage & Wagon Co. Ltd. to the Maharaja of Indore

The coach embodies many features of the Palace at Indore which is designed for the Maharaja, and presents a number of interesting innovations. The inspection of the underframe and bogies, and running conditions, was carried out by Messrs. Rendel, Palmer & Tritton. The leading dimensions are as follow:—

Overall length of body	68 ft. 0 in.
Width of body at waist panels	9 ft. 11 13/16 in.
Height from rail to top of roof	12 ft. 8¾ in.
Centres of bogies	48 ft. 0 in.
Wheelbase of bogies	10 ft. 0 in.
Gauge of railway	5 ft. 6 in.
Tare weight in running order with tanks full, and complete with ice for air cooling	54 tons

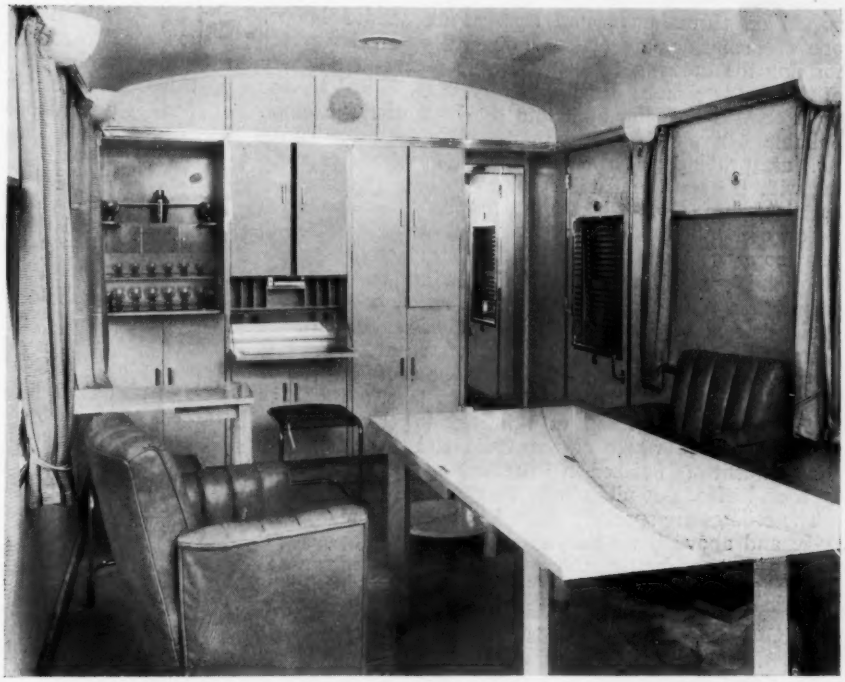
duced the equipment is very complete, comprising: sitting room; bedroom; Maharaja's bathroom and W.C. compartments; nursery; nursery bathroom; corridor leading to A.D.C.'s room; A.D.C.'s shower room; A.D.C.'s lavatory; servants' room; servants' lavatory; and kitchen.

Sitting Room

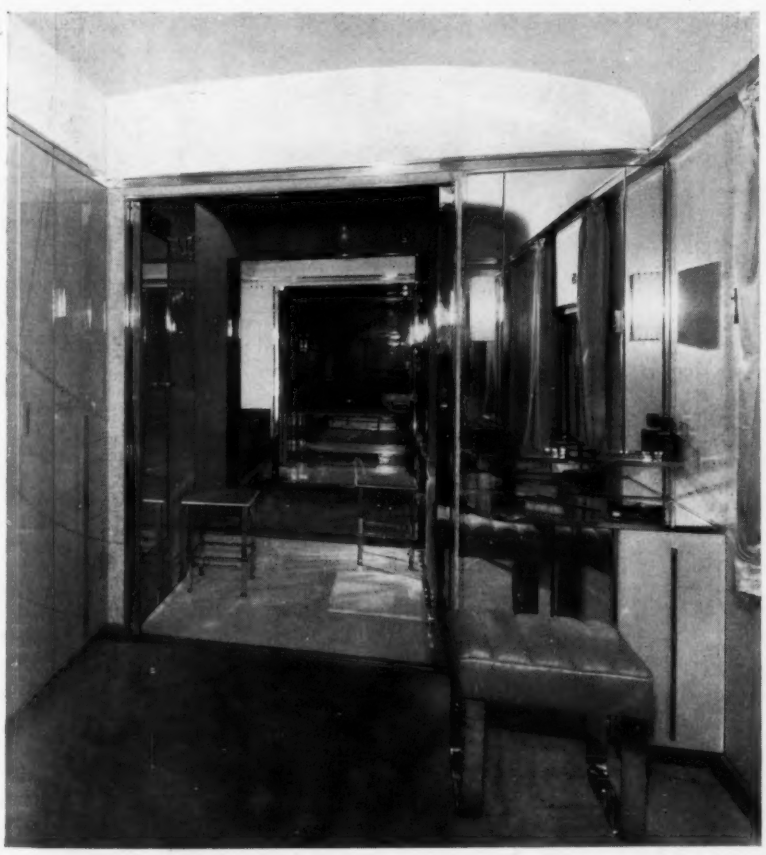
Briefly, the equipment of the various rooms is as follows: The sitting room is 19 ft. 6. in. long by 9 ft. wide, and is equipped with windows 4 ft. long, and two main entrance doors 2 ft. 5 in. wide. At one end of the vehicle there is a cabinet with door opening to a cocktail bar, a writing desk, and a Marconi radiogram. Provision

is made in this cabinet for storing a small folding table which is normally attached to the body side by clips. The Marconi set is fitted with an automaic record changing device and is electrically operated. A settee, convertible into a bed for occasional use, is fitted at the other end, with drawers below it for bedding. The other furniture in this room comprises an extending table, a coffee table and three chairs, instantly adjustable by Quicktho mechanism from the vertical to a part reclining position. All the furniture in this room is of sycamore. The floor is covered with a luxurious hand made carpet in pale cream.

The windows are of special design. Each opening has a clear frameless light, a tropical tinted frameless light, and metal louvre frames. These are operated by chain gear with detachable handles, and window units complete were supplied by Quicktho (1928) Limited. The side doors are fitted with one clear glass and a louvre frame. Blinds operated by Piper electric mechanism, are fitted to the window openings, and are actuated by a motor at solebar level. Two press buttons control the upward and downward movement of the blind. Rose pink curtains are also fitted at each window. Cornice and skirting mouldings are in stainless steel. The ceiling is finished in a specially stippled cream paint, whilst all the walls are lined with a synthetic parchment of cream shade. Six two-light fittings of special modern design are fitted on the body side at cornice level, and two, of different design, on the cross partition above the settee. The entrance doors to the bedroom and corridor are of the double-swing type, and are chromium plated with a full length mirror each side. All metallic furniture throughout the coach is finished in chromium plate. A clock of modern design is fitted in this room.



Interior of sitting room in the saloon coach, showing cocktail bar, writing desk, and other appointments



Views from bedroom, through bathroom and nursery, towards nursery bathroom

Bedroom and Baths

The bedroom is very tastefully arranged, the finish and carpet being the same as in the drawing room, except that all mirrors are pink tinted, and the curtains are pink. The furniture comprises a 4-ft. 6-in. bed with three drawers beneath, a wardrobe, and a dressing table made up almost entirely of mirrors, and with a nest of drawers. A glass table is also provided, with tapered square legs covered completely in pink bevelled mirrors. The stool at the dressing table is upholstered in pink tapestry and sup-

ported on chromium plated legs. Pink shaded lamps, one at each side, are fastened directly on to the mirror forming the dressing table. In the partition at one side of the bed is a niche fitted with a glass shelf, and lighted by a concealed fitting built into the back of the cabinet. Suitable bell pushes, berth lights, plug for table lamp, &c., are provided; also a wall bracket telephone connecting with the staff. All the furniture, comprising carpets, curtains, and chairs, has been supplied by Waring & Gillow of London. A modern design clock is also fitted in this room.

Adjoining the bedroom is the main bathroom, which comprises a full-size bath with sponge racks, hot and cold water, hot and cold spray, and an anti-splash rim. A mirror with chromium-plated frame is fitted along the side of the bath. On the opposite side of the room is a washbasin with anti-splash rim, hot and cold taps, a frameless mirror above, and fitted with heated towel rail, bottle racks, &c. The whole of the walls and ceiling of this compartment are finished in Vitroflex, made up in mosaic form and of eau-de-nil colour.

The ceilings are specially shaped to enhance the appearance, and above the washbasins the ceiling is coved and fitted with two electric lamps to light up the mirror. A special feature of this room is the design of the wide entrance doors, of the twin sliding type, one door operating the other. The action is particularly smooth and silky. Each door is chromium plated, with a full length mirror; no fixing screws are visible. A mirror is fitted to each side of the door, and those on the bedroom side are pink tinted.

Bathroom and lavatory floors are covered with plain white rubber sheeting. The lighting fittings in the bathroom are circular mirrors, bevel edged, with the lamp bulb mounted direct on to the face. Opening from the main bathroom is a W.C. compartment fitted with a small type pan. The flushing is of the push valve type, supplied from roof tanks at each end of the coach. This compartment is also finished in Vitroflex. The same type of windows is fitted as for the other rooms, except that the clear glass is replaced by a window of white enamelled glass. This also applies to the bathroom windows.

Nursery and Bathroom

Twin double-doors are fitted each end, and the furniture comprises longitudinal berths each side; one berth is fitted with a movable cot side, which is pivoted, and slides under the berth when not required. On this side also are two hinged cushions, which when hinged up form an upper berth, the free ends being supported by chains from the roof. At the opposite side, at cornice level, is fitted a chromium plated parcel rack. The stainless steel cornice moulds and interior finish are the same as for the drawing room. The carpet is pink, and there are two folding tables. Lamps are of the mirror type previously described, and sunk berth lights are provided.

At the end of the car is the nursery bathroom. A small bath is arranged transversely, and equipped in a similar manner to that in the main bathroom. This room is also finished in Vitroflex, of the same colour as for the other bathroom.

The small wash hand-basin is fitted with hot and cold supply, also a heated towel rail. A cupboard from floor to ceiling is provided, and a roof tank is fitted above. A W.C. compartment opens from the bathroom, and is equipped and finished similarly to the W.C. for the Maharaja.

The A.D.C.'s compartment has accommodation for two, and is provided with a seat upholstered in green leather, the back of which hinges up to form an upper berth. The walls and ceiling are covered in parchment, and the floor with a pink carpet. Adjoining this room is a shower compartment fitted with hot and cold sprays and a folding washbasin. A separate W.C. compartment is provided, accessible from the corridor.

There is accommodation for two in the servants' compartment, which has a hinged upper berth fitted with cushions. Adjoining this is the W.C. compartment. Parchment covers the walls and ceiling of the corridor. A passenger alarm valve is fitted in the body side, also the main switch and telephone.

The kitchen is situated at one end of the coach, and is completely finished in stainless steel. It should be noted that the main cooking is done at the Maharaja's palace, the food being brought and stored in an ice chest in this kitchen. A primus stove is provided for boiling water for tea. An ice chest is fitted; also a sink and tables. A rack of shelves is fitted above the one table for crockery storage. The cupboards have sliding doors, and crockery racks in stainless steel faced plywood. One corner of the kitchen houses the Thermotank air-conditioning equipment, and the other the charcoal-fired boiler and hot tank. Both these items are completely screened in stainless steel. A clock is fitted in the kitchen.

Telephones and Air-Conditioning

Telephones are fitted in the nursery, bedroom and drawing room, communicating with a telephone in the corridor near the servants' quarters. Electric bells are also provided. The air-conditioning is a special feature of this coach, and has been supplied by Thermotank Limited, of Glasgow. Air is drawn through the body side at the kitchen end; is filtered, cooled, or heated, as required; and pumped through ducts fitted above the ceiling to distributors in the ceiling. An ice-box with a capacity of 25 cwt. of ice is carried in the underframe, and water is pumped over the ice for cooling before being passed to the air-conditioning unit.

For heating, there is a charcoal fired boiler in the kitchen, and the hot water from this, in addition to heating the conditioning unit, is used for the baths and kitchen. After the air is used in the various compartments it is drawn back through re-circulating grids in the ceiling to the conditioning unit, where fresh air is added and purified, and pumped back to the distributors. While this plant is in operation all the windows are kept closed. In temperate weather the plant may be used simply for ventilating, without altering the outside temperature of the air. Fresh filtered air is then supplied without opening the windows, although these may be opened as if the car were not air-conditioned.

Insulation

In order to suit the Indian climate and the air-conditioning equipment, the coach is most efficiently insulated, J. W. Roberts sprayed asbestos being used. Half-inch sprayed asbestos is used for all body panels, inner and outer; the outer roof sheets; and the underside of the dovetail section floor. At the canopy roof sheets 1-in. asbestos is used. There is an air space 4 in. deep between the outer roof sheets, and then a lining of insulating panels. The space between this and the Sundeala ceiling is sealed and used as a duct for the re-circulated air. The space between waist panels and solebars is sealed from the outer air except for small drain holes for moisture.

Electric Lighting

The very complete lighting equipment, together with fittings of modern design, and the generating set have been supplied by J. Stone & Co. Ltd., London, and comprise a belt-driven dynamo, accumulators, &c., also the standard I.R.S. junction box fitted at each end of the coach. To improve the outside appearance, valances are

fitted to within 10 in. of rail, certain of these being hinged for access to ice box, dynamo, and batteries. Cast aluminium steps of special design are fitted in the valances.

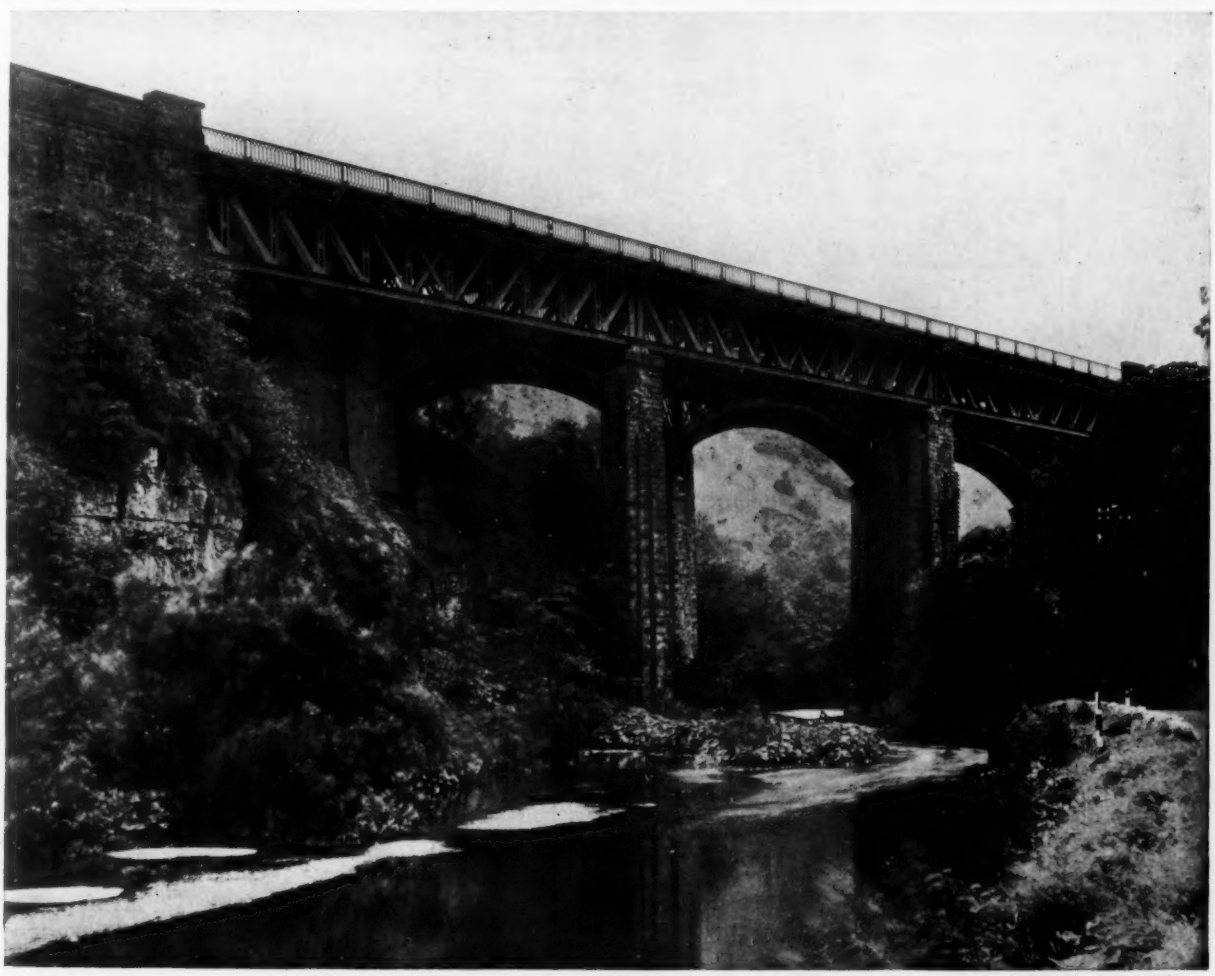
The standard vacuum brake is fitted, also a hand brake with hand wheels at each body side; the latter operates on one bogie only and is used for holding the coach when on a siding. The water supply totals 500 gallons, tanks being arranged in the underframe and over the nursery bathroom and kitchen. Tank fillers are fitted at roof level, also at solebar level to suit all conditions of filling.

The paintings on the sides of the coach, comprising the Armorial Bearings of the State of Indore on the panels, and the personal Devices of Their Highnesses on the doors, were executed by Mr. H. C. Francis, of Barnet, the heraldic artist, who has painted the Royal Arms and other insignia on most of the State coaches and carriages for Their Majesties Queen Victoria, King Edward VII, and King George V, as well as for King George VI.

Sub-Contractors

The main sub-contractors on this contract were as follow:—

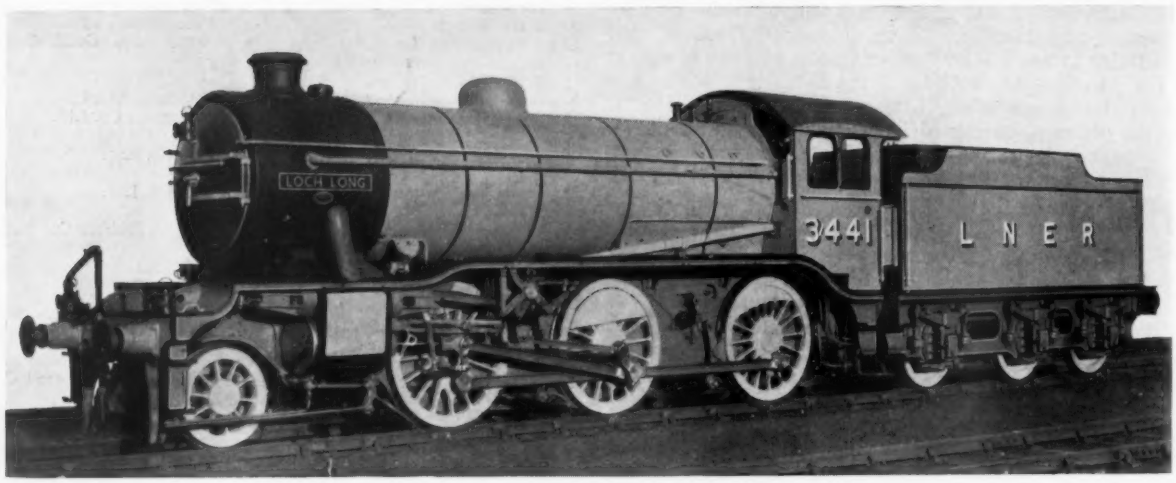
Furniture, carpets and curtains	Waring & Gillow Limited
Louvres, windows, and operating gear	Quicktho (1928) Limited
Door locks and handles, and private locks	J. Kaye & Sons
Mirrors	Pilkington Bros.
Exterior body panels	Baldwins Limited
Electric lighting and generating equipment	J. Stone & Co. Ltd.
Air-conditioning equipment	Thermotank Limited
Electric blind-operating gear	Piper Blind Operator,
Dovetail floor sheets and sliding door gear	Beckett, Laycock & Watkinson, Limited
Sundeala ceilings	G. D. Peters & Co. Ltd.
Chromium-plated facias for twin sliding doors, mirror frames and mouldings	The Birmingham Guild Company
Sliding door operating gear, etc.	John Levick Limited
Vitroflex panelling for bathroom and W.C. compartments	British Vitroflex Co. Ltd.
Hand-painted coats of arms and crests	H. C. Francis, Esq.
Baths, bathroom and W.C. fittings, etc.	Doulton & Co. Ltd.
White rubber flooring in bathrooms and W.C. compartments	North British Rubber Company
Nuvac ventilators	Airvac Limited
Staybrite cornice and skirting sections	G. Stevens & Co.
Decolite and sprayed asbestos	J. W. Roberts Limited
Chromium-plated fascias and mouldings for swing doors	Cooke's (Finsbury) Limited
Stainless steel faced plywood for cupboard sliding doors	Tucker Armoured Plywood Co. Ltd.
Radiogram	E.M.I. Service

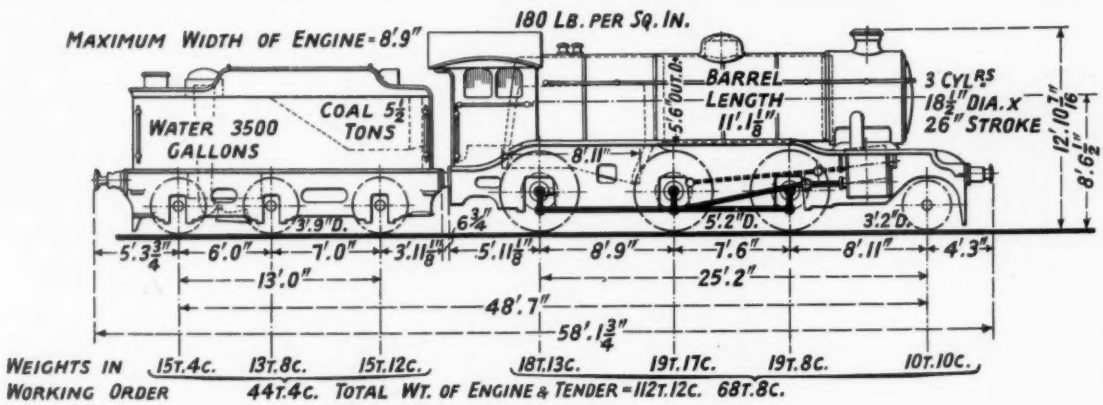


Picturesque setting of the Millers Dale viaduct, which carries the Derby—Manchester main line of the L.M.S.R. (Midland Section). The steelwork was fabricated by the Butterley Co. Ltd. and erected in 1904

NEW 2-6-0 TYPE LOCOMOTIVES, L.N.E.R.

Introduced for service on the West Highland section, and to avoid double heading





The K.4 class engines of the L.N.E.R.

IN order to avoid double heading on the heavily graded West Highland line of the L.N.E.R., where axle loads are strictly limited, a new three-cylinder 2-6-0 type locomotive (known as Class K.4) has been built at the company's Darlington works to the design of Sir Nigel Gresley, Chief Mechanical Engineer. The engine is numbered 3441 and has been named *Loch Long*. It is fitted with the standard 3,500-gall. tender. The pony truck is of the double swing-link pattern with a translation of 4½ in., and has wheels 3 ft. 2 in. in diameter. The coupled wheels are 5 ft. 2 in. in diameter.

Three cylinders, 18½ in. dia. × 26 in. stroke, cast in one piece, drive the second pair of coupled wheels. The piston valves are 8 in. diameter, with a maximum travel of 5⅝ in. and a maximum cut-off of 65 per cent. The outside valves are operated by Walschaert valve gear, and the inside valve by the Gresley system of two-to-one and equal levers from the outside valve spindles. The valve gear, and nickel chrome connecting and coupling rods are standard, like those used on the company's K.3 type engines. Cylinder and axlebox lubrication is effected by means of Wakefield mechanical lubricators.

The principal particulars of the new engines are as follow :—

Cylinders (3) dia.	18½ in.
Piston stroke	26 in.
Wheels, coupled dia.	5 ft. 2 in.
,, pony truck	3 ft. 2 in.
Wheelbase, rigid	16 ft. 3 in.
,, total engine and tender	48 ft. 7 in.
Boiler—	
Heating surface, firebox	168·0 sq. ft.
Tubes	871·1 sq. ft.
Flues	382·5 sq. ft.
Total (evaporative) heating surface	1,421·6 sq. ft.
Superheater, no. of elements	24
,, heating surface	310 sq. ft.
Heating surface (combined) total	1,731·6 sq. ft.
Steam pressure	180 lb. per sq. in.
Grate area	27·5 sq. ft.
Tender water capacity	3,500 gallons.
Coal capacity	5½ tons.
Weight of engine in working order	68 tons 8 cwt.
,, ,, tender ,, ,, ,,	44 tons 4 cwt.
Total weight (engine and tender)	112 tons 12 cwt.

The boiler barrel is 5 ft. 6 in. in diameter and 11 ft. 7⅛ in. between tubeplates. The firebox has a grate area

of 27·5 sq. ft. and is fitted with narrow firebars giving 56 per cent. air space. The two 3-in. diameter Ross pop safety valves are set to blow off at a working pressure of 180 lb. per sq. in., and a Robinson type 24-element superheater is fitted. The boiler is fed by a Davies & Metcalfe No. 9 Class H exhaust steam injector on the right-hand side, and a Gresham & Craven No. 10 live steam injector on the left-hand side. The boiler barrel is insulated with asbestos blocks, and the firebox with asbestos mattresses. Vacuum brake apparatus is fitted to both engine and tender, and steam heating appliances are provided.

The adhesion weight amounts to 57 tons 18 cwt., and the engine develops a tractive effort at 85 per cent. of the boiler pressure of 32,939 lbs. The West Highland Section of the L.N.E.R. begins at Craigendoran Junction, which is about quarter of a mile east of the station, and the country traversed from this point to Fort William and from Fort William to Mallaig is exceedingly difficult. A profile will be found in "Gradients of the British Main Line Railways" (published from this office, price 5s. net).

The following is a comparison between the K.3 and K.4 type engines :—

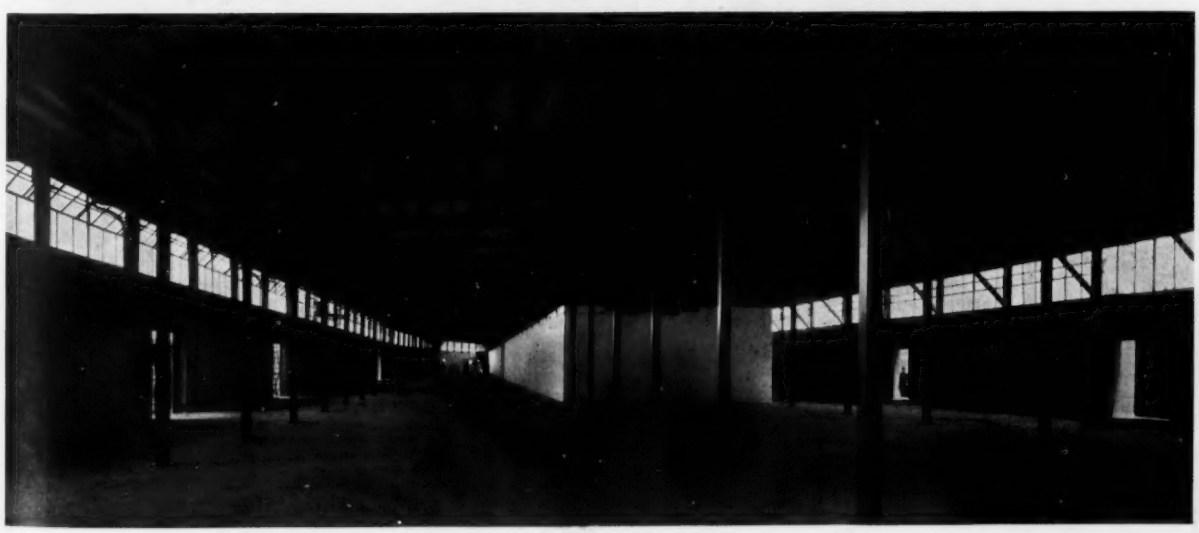
Type	Cylinders		Driving wheel dia.	Boiler pressure	Weight in working order				Total heating surface (including superheating surface)	Grate area	Tractive power at 85 per cent. boiler pressure
	Dia.	Stroke			Engine		Tender				
				Lb.	Tons	cwt.	Tons	cwt.	Sq. ft.	Sq. ft.	Lb.
K.3 ..	18½ in.	26 in.	5 ft. 8 in.	180	72	10	52	0	2,308	28	30,031
K.4 ..	18½ in.	26 in.	5 ft. 2 in.	180	68	8	44	4	1,732	27·5	32,939

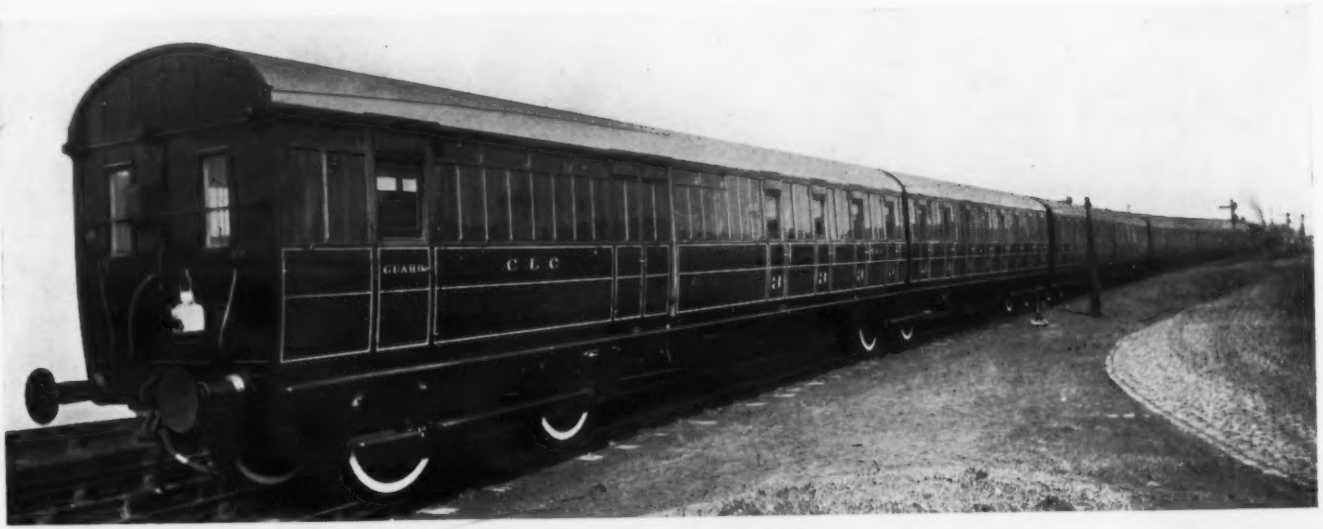
New Grain Warehouse at Romanshorn, Swiss Federal Railways

Left : Exterior view of warehouse showing chute under platform and doorway for discharging grain, and inclined pipe above it for loading

Below : The interior showing construction and silos

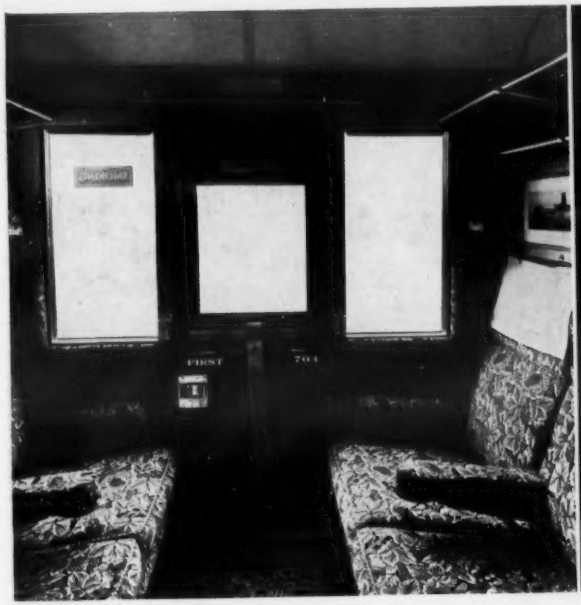
(*See page* 743)





New Rolling Stock for C.L.C. Liverpool-Manchester Service

(*See article on page* 748)



First class

Lavatory

Third class

RAILWAY NEWS SECTION

PERSONAL

INSTITUTE OF TRANSPORT

The following were among the members and associate members elected during March:—

Members

Mr. A. S. Deacon, Workshops Superintendent, Queensland Government Railways.

Mr. H. G. Humphreys, District Goods Manager, Manchester, L.M.S.R.

Mr. G. F. Perera, Acting General Manager, Ceylon Government Railway.

Mr. M. P. Sells, O.B.E., Chief Mechanical Engineer, Nigerian Government Railway.

Associate Members

Messrs. C. S. Hall, L.M.S.R.; W. Hickman, Brush Electrical Engineering Co. Ltd.; P. Manifold, Burma Railways; and J. R. Roberts, Tanganyika Government Railways.

PENNSYLVANIA RAILROAD STAFF CHANGES

Mr. A. H. Rudd, Chief Signal Engineer, retired on March 31.

Mr. W. M. Post has been appointed as Chief Signal Engineer, as from April 1.

Mr. H. L. Stanton has been appointed to succeed Mr. Post as Assistant Chief Signal Engineer.

Mr. C. W. Hixon has been posted as Superintendent of Telegraph and Signals, Eastern Region, in place of Mr. Stanton.

Mr. R. F. Raughley, Assistant Superintendent Telegraph and Signals, Eastern Region, has taken the place of Mr. Hixon as Superintendent of Telegraph and Signals, Western Region, all as from April 1.

INDIAN RAILWAY STAFF CHANGES

Mr. H. Jackson, Deputy Chief Mechanical Engineer, N.W.R., has been permitted to retire from Government service as from February 18.

Mr. C. F. Gilbert, Deputy Agent, E.I.R., has been granted leave for 8¼ months, as from February 1, in continuation of two months' previously granted.

Mr. C. B. Hayes has been appointed to officiate as Superintendent of Stores, Burma Railways.

From *The London Gazette* of April 9: Regular Army, Supplementary Reserve of Officers; Royal Engineers; Transportation: Messrs. J. R. R. Price and C. W. Edwards to be Second Lieutenants (April 10).

We are informed that Sir Seymour B. Tritton, K.B.E., has now retired from the position of active Senior Partner in the well known firm of consulting engineers, Messrs. Rendel, Palmer & Tritton, though his services will be available to his firm in an advisory capacity. He was born in 1860 and was educated at Haileybury and University College, London. His technical training he received at the works of R. & W. Hawthorn, now Hawthorn, Leslie & Co. Ltd., in Newcastle-on-Tyne, then one of the best known locomotive as well as marine engine builders; he was trained in both branches. In 1885 Sir Seymour proceeded to India as Assistant Locomotive & Carriage Superintendent of the Bengal & North Western Railway, but subsequently was appointed Assistant Superintendent and Works Manager on the Eastern Bengal State Railway at Kanchrapara. After rebuilding the first workshops there under Mr. A. W. Rendell, he remained on the E.B.S.R. for some years, eventually being placed in charge of the Locomotive, Carriage & Wagon Department of the Northern Bengal metre gauge section, which had recently been taken over by Government. Later he was sent home on sick leave and was then offered the post of Chief of the Staff to Sir Alexander Rendel, K.C.I.E.; he subsequently became a partner with him and Sir Frederick Palmer, the name of the firm from 1913 being Rendel, Palmer & Tritton. During the war his firm was appointed Consulting Engineers for the War Office and Ministry of Munitions, and all matters concerning the design and inspection of new railway work, on all fronts, and details of the military light railways—of which some 3,000 miles were in operation at the Armistice—were worked out at its offices in Dartmouth Street. As many as 8,990 miles of track, 3,400 locomotives (many of them built and inspected in America) and nearly 72,800 wagons were designed or modified and inspected prior to being sent out to the various fronts. For his services in this connection Sir Seymour was created a K.B.E. in 1918. In 1924, at the request of the Government of India, he visited that country in connection with the design and introduction of the standard locomotives, taking with him preliminary designs prepared in England to meet the Indian Standards Committee's requirements. He also visited and reported on various Indian railways, and the ports of Chittagong, Karachi and Madras, for which his firm acts as consultants; he received the thanks of the Secretary of State for the services he rendered on this tour. Sir Seymour has sat on several committees of the British Standards Institution the specifications of which have now been universally adopted. He has always been specially interested in inspection and has been responsible for the large staff of inspectors employed by his firm, here and on the Continent, and is also an authority on the design of light-draught river steamers, on which subject he has contributed papers. He is a Member of the Institutions of Civil and Mechanical Engineers and of Naval Architects and is past-President of the Institution of Locomotive Engineers. Further particulars of his career are embodied in an editorial on page 733.

Photo [*Vandyk*

Sir Seymour B. Tritton, K.B.E.,

who has retired from the position of active Senior Partner, Messrs. Rendel, Palmer and Tritton, Consulting Engineers

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Mr. E. Cappi has been appointed Estate Officer, Victorian Government Railways.

Elliott [*& Fry*

Mr. Oliver Bury,

Chairman of the Leopoldina Railway, 1913–37

Mr. Oliver R. H. Bury, M.Inst.C.E., who, as announced in our issue of April 2, has resigned the Chairmanship of the Leopoldina Railway and Leopoldina Terminal Companies (while retaining his seat on the two boards), has had administrative experience both of British-owned South American, and of home railways. Receiving his early training in England in the Engineering and Locomotive Departments of the London & South Western Railway, and also in the Civil Engineering Branch of the Coleford & Monmouth Railway, he was later appointed Chief Engineer of the Great Western of Brazil Railway. After becoming General Manager and Chief Engineer of the Entre Rios Railways, Mr. Bury was next made General Manager of the Buenos Ayres & Rosario Railway—already, before its amalgamation with the Central Argentine, one of the largest in Argentina. This appointment Mr. Bury held until, returning to England in 1902, he took up the General Managership of the Great Northern Railway. His tenure of this office coincided with the rapprochement effected in 1906 between the Great Northern, and Great Central Railways, which had been fierce competitors since the opening of the Great Central main line to London in 1899. An agreement concluded on December 3, 1907, between the two companies for joint working in perpetuity was held by the Courts in 1908 to be *ultra vires*. The Great Northern, Great Central, and Great Eastern Railways then promoted in November, 1908, a Bill for joint working, which was given a second reading in the House of Commons in 1909, but was withdrawn by the promoters before the Committee stage in view of the onerous conditions actually, and likely to be, imposed. Without the Bill the three companies succeeded by co-operation in effecting appreciable economies. Mr. Bury was in 1904 selected by the Government to form a commission, in conjunction with Lord Farrer and Major Le Breton, to report on the working of the Egyptian State Railways. The report was published early in 1905. Resigning from the General Managership of the G.N.R. in 1912, he remained on the board of the company, and is now a Director of the L.N.E.R., also representing that company as Chairman of the Cheshire Lines Committee. Since grouping, he has acted as Chairman of some of the principal L.N.E.R. committees. Mr. Bury joined the board of the Leopoldina Railway as Chairman in October, 1913. He is Chairman of the San Paulo (Brazilian) Railway, and of the London Electric Supply Corporation Limited; and Chairman and Managing Director of the Peruvian Corporation Limited. He is also a Director of the Forth Bridge Railway Company, the City and International Trust Limited, the London Electric Power Co. Ltd., and other concerns.

Lafayette [*Dublin*

Mr. E. C. Bredin,

Appointed Chief Mechanical Engineer, Great Southern Railways (Ireland)

Mr. E. C. Bredin, who, as announced in THE RAILWAY GAZETTE of March 26, has been appointed Chief Mechanical Engineer, Great Southern Railways, in succession to Mr. A. W. Harty, retired, was educated at Mountjoy School, Dublin. He began his engineering training as an apprentice in the works of Fielding & Platt, Gloucester, from November, 1905, to November, 1907, and was later a pupil in the locomotive, carriage and wagon works of the Great Southern & Western Railway, Inchicore, from November, 1907, to November, 1909, when he was attached to the Locomotive Engineer's Office, Inchicore, in connection with locomotive coal consumption; he was subsequently appointed as Junior Assistant to the Running Superintendent. In 1911 Mr. Bredin was appointed Shed Foreman at Rosslare (G.S. & W.R.), and his duties included the operation and maintenance of the electric generation station, gas works and electric cranes. Three years later he was appointed Assistant to the Running Superintendent, and later District Locomotive Superintendent, Northern District, Inchicore. In 1916 Mr. Bredin was promoted to be Assistant Works Manager, Inchicore, and in 1921 became Works Manager there. In 1925, on the amalgamation of the railways in the Free State, he carried out the reorganisation of the various locomotive workshops on the system, and thereafter generally supervised their co-ordinated working. His promotion to his present position dates from April 1, 1937. Mr. Bredin is a member of the Institution of Mechanical Engineers and the Institution of Civil Engineers, Ireland.

Mr. P. Ennis,

Appointed Works Manager, Inchicore, Great Southern Railways (Ireland)

As a result of the promotion of Mr. E. C. Bredin to be Chief Mechanical Engineer, Mr. P. Ennis has been appointed to succeed him as Works Manager, Inchicore, Great Southern Railways, Ireland. Mr. Ennis began his engineering career in the Broadstone locomotive, carriage and wagon works of the Midland Great Western Railway, and, having passed through various positions, was appointed Works Manager there in January, 1922. On the amalgamation of the Free State railways, he became Assistant Works Manager at Inchicore, G.S.R., the position from which he is now promoted to be Works Manager.

Sir Walter B. Clode, M.A., K.C., late President of the Railway Rates Tribunal, whose death we announced in our issue of March 5, left estate valued at £98,119 (£95,927 net).

The Institution of Civil Engineers has conferred on Sir Robert Hadfield, Chairman of Hadfields Limited, the distinction of honorary membership of the institution in recognition of the long and conspicuous services rendered by him to the advancement of metallurgical science.

We learn with regret of the death, on April 4, in Melbourne, of Mr. Wellington Carrington, M.Inst.C.E., in his 88th year. He was first connected with the Geelong Queenscliff railway construction, and was subsequently engaged upon the doubling of various lines in New South Wales. In 1895 he entered the service of the West Australian Government and rose to be Chief Engineer for Harbours & Rivers and Deputy Engineer-in-Chief of Railways, retiring at the age of 65. From that age until he was 77 Mr. Carrington was a Consulting Engineer in Victoria.

The Council of the Institute of Transport announces that Sir Alexander Gibb, G.B.E., C.B., F.R.S., has been elected President of the Institute for the year beginning October 1, 1937.

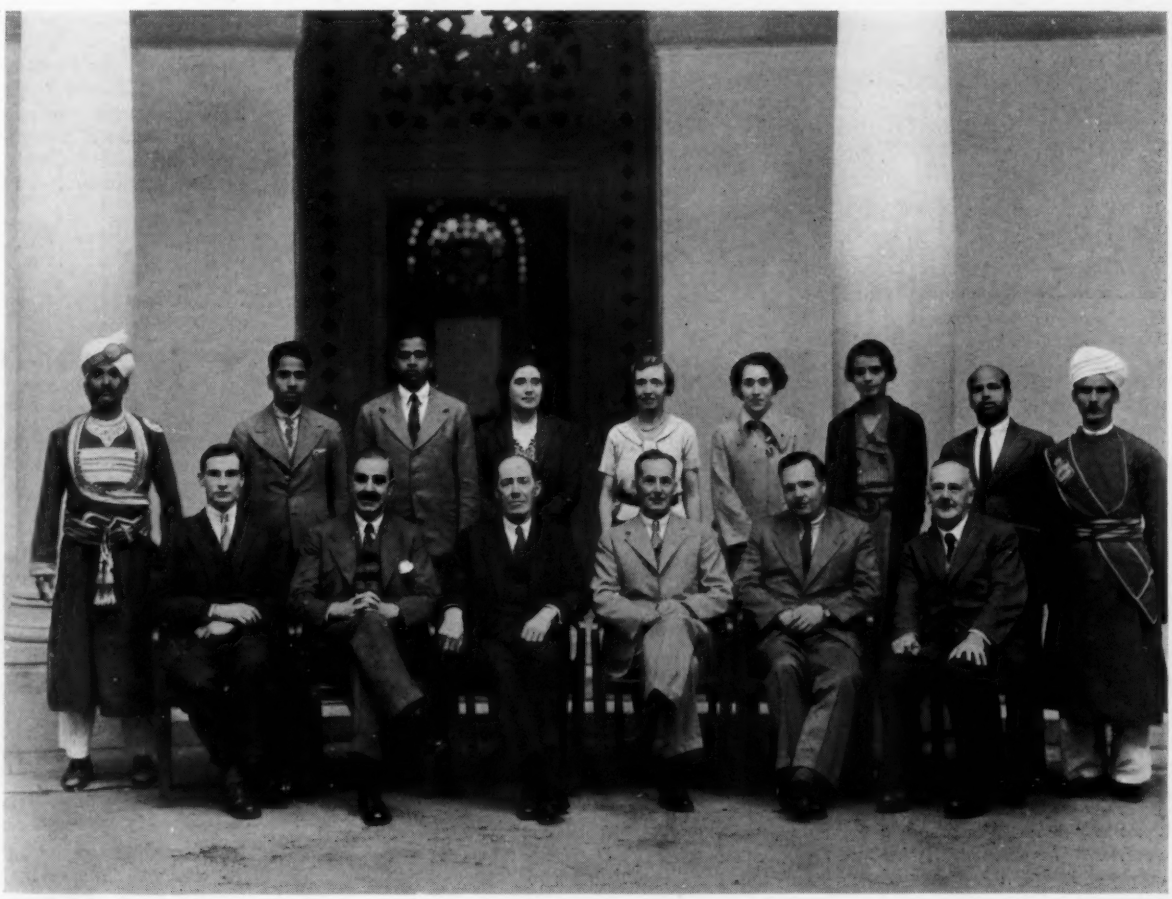
We regret to record the death of Mr. D. J. Anderson, Publicity Representative, Glasgow, L.M.S.R.

Mr. H. M. Ingledew, sometime Solicitor to the former Taff Vale Railway, whose death we announced in our issue of February 5, left estate valued at £21,097 (£16,452 net).

On Thursday, April 8, at Titwood Parish Church, Glasgow, the wedding was solemnised of Mr. Emrys O. Roberts, son of Mr. O. Glynne Roberts, O.B.E., Secretary of the London Midland & Scottish Railway Company, and of Mrs. Roberts of Hampstead, London, and Miss Elizabeth Ballantyne, second daughter of Mr. John Ballantyne, O.B.E., J.P., Chief Officer for Scotland of the L.M.S.R., and Mrs. Ballantyne of Pollokshields, Glasgow. Among the guests at the reception which followed the ceremony were:—

Sir Robert and Lady Bruce, Sir William and Lady Thomson, Mr. and Mrs. A. P. J. Ball, Mr. and Mrs. Wm. Crozier, Mr. and Mrs. W. H. Clay, Mr. and Mrs. G. L. Darbyshire, Mr. and Mrs. J. H. Follows, Captain J. W. Harris, Mr. and Mrs. T. H. Moffat, Mr. and Mrs. A. H. McMurdo, Mr. and Mrs. Newlands, Mr. and Mrs. J. N. Phillipps, Mr. and Mrs. S. E. Parkhouse and Mr. and Mrs. W. Yeaman.

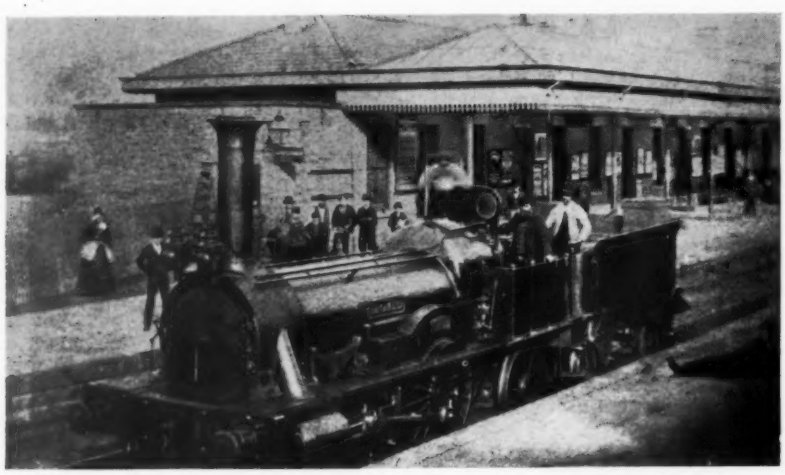
A conspicuous wedding gift among the large number received was a handsome silver salver presented by the Chairman and chief officers of the L.M.S.R. bearing the facsimile signature of each officer. Mr. Emrys Roberts is attached to the staff of the Divisional Superintendent of Operation at Crewe.



Left to right: seated: Mr. B. M. Strouts, Mr. W. A. Stanier, Sir Ralph Wedgwood, Mr. H. Cheadle, Mr. A. Forbes Smith, and Mr. L. H. Kirkness.
Standing: Mr. Ramamurthi, Mr. Narayan, Miss Bease, Miss D. Thompson, Miss Da Costa, Miss Hankins, and Mr. Haran.

Members of the Wedgwood Indian Railway Inquiry Committee, with secretarial staff, at Delhi

Right : The railway station at Denain-Mines, in North-East France, which has just celebrated its centenary and is being demolished. An editorial note on the subject appears on page 734



Left : View taken about 1850 at what was then known as Thorneybank station at Burnley, now called Manchester Road. The relative modernity of the station awning and buildings contrasts sharply with the locomotive. The latter was the "Diomed," of the standard 2-2-2 passenger type of the Lancashire & Yorkshire Railway, designed by Hurst under the supervision of John Hawkshaw, and built in 1849

Right : Sir Josiah Stamp at the new Leeds Corporation Transport depot which he opened on Friday last, April 9. The building, which has accommodation for 80 tramcars and 112 buses, covers 92,000 sq. ft.

Ancillary Businesses of the British Railways in 1936

1.—Docks, Harbours, and Wharves

The general improvement in trade and industry last year was reflected in increased business at the railway-owned docks, harbours, and wharves, the gross receipts in respect of which amounted to £6,812,527, an increase of £203,623 or 3·1 per cent. compared with 1935. Net receipts increased by £167,485 or over 33 per cent., but this was largely due to the reduction in the companies' liability in respect of rates and rate relief. The individual results of the four group companies are set out in the following table:—

Docks, Harbours, and Wharves, 1936

Company	Receipts		Expenditure		Surplus		Per cent. of Surplus to Gross Receipts	
	1936	1935	1936	1935	1936	1935	1936	1935
	£	£	£	£	£	£		
G.W.R. ...	1,886,021	1,947,783	1,766,320	1,901,100	119,701	46,683	6·3	2·4
L.N.E.R. ...	2,735,031	2,655,566	2,551,385	2,540,750	183,646	114,816	6·7	4·3
L.M.S.R. ...	991,336	905,570	978,507	890,735	12,829	14,835	1·3	1·6
S.R. ...	1,200,139	1,099,985	842,486	769,975	357,653	330,010	29·8	30·0

It will be seen that, in the case of the G.W.R., gross receipts declined by £61,762, due entirely to a reduction in dock dues on ships and goods. On the other hand, expenditure decreased by £134,780, principally on account of a reduction of no less than £120,336 in respect of rates and rate relief fund. The net result was an increase of approximately £73,000 in the surplus receipts. Sir Robert Horne, in his speech to the shareholders at the annual general meeting, emphasised that the increased profit was entirely due to the reduction in the company's liability for rates and rate relief, without which no profit whatever would have been earned on the £21,000,000 invested in the dock undertaking. The position of the G.W.R. docks has been one of increasing difficulty ever since 1929, and circumstances last year were discouraging in the extreme. Coal exports, which constitute the most important business of the Bristol Channel docks, declined by 2,500,000 tons, the total shipments abroad last year having been only 15,887,000 tons, compared with 28,795,000 tons in 1929. The 1936 decrease was principally due to reduced shipments to Italy, Egypt, Spain, and Canada.

The South Wales coal trade has been severely affected by subsidised foreign competition, and strong appeals have been made for Government action which would assist the industry to regain its former position in the competitive markets of the world. Meanwhile, the G.W.R. has been forced to economise in every possible direction, and was reluctantly compelled last year temporarily to close Penarth dock. Expenditure has now been reduced to the lowest possible level compatible with the maintenance of efficiency, and the future of the Bristol Channel ports depends entirely upon the degree to which it is found possible to restore industrial prosperity to South Wales.

The L.N.E.R., whose dock undertaking also suffered during the economic depression, was more fortunate than the G.W.R. last year, and secured an increase of £79,465 in gross receipts, of which £55,000 was in respect of cranage and other services. Expenditure increased by less than £11,000 in consequence of a reduction of £79,800 in the company's liability for rates and rate relief, with the result that there was an increase of £68,830 in the net profit. The North East Coast ports are not so dependent upon the coal trade as are those of South Wales, and reduced coal shipments last year were counteracted by increased imports and exports of other commodities, notably imports of timber and iron ore. There was also a marked improvement in the fish landings at Hull.

The L.M.S.R. recorded an increase of £85,766, or nearly 10 per cent., in dock receipts. There were substantial increases in expenditure, however, notably on dredging and maintenance of dredging plant and operating expenses, with the result that, even with the aid of £93,700 transferred from renewal account compared with only £31,000 in 1935, the surplus showed a decrease of £2,006. In the case of this company, a credit of £25,000 was taken for the reduction in rates and rate relief in the 1935 accounts, and there were increases under these heads last year.

The Southern Railway secured an increase of £100,154, or 9 per cent., in gross receipts. Expenditure increased by £72,511, despite a decrease of over £15,000 in the amount transferred to renewal or suspense account, and the net surplus was increased by £27,643 to £357,653. It should be noted, however, that even this seemingly excellent result represented a return of only just over 2½ per cent. on the £13,738,965 of capital invested in this company's dock undertaking. Like the L.M.S.R., the S.R. took credit for the reduction in rates and rate relief in 1935, and there was a slight increase under these heads last year.

The business at the company's Southampton docks was exceptionally good in 1936, the tonnage of shipping entering the docks having been the highest ever recorded, as was also the number of passengers dealt with. Improved conditions in the North Atlantic passenger trade, and the introduction of larger and faster boats by the Union Castle Line were the principal factors responsible for this encouraging position. In addition, the *Queen Mary* was commissioned in May, 1936, and has recently completed her first overhaul in the King George V graving dock. There was a substantial improvement in freight traffic, increased shipments having been received from South Africa, Australia, and New Zealand. There were also satisfactory increases in the timber and grain dealt with.

Dock Improvements

The past year witnessed a continuance of the companies' policy of modernising and improving their dock undertakings. The G.W.R. installed new impounding pumps at Swansea docks, where serious difficulties have been experienced in the past in maintaining a sufficient depth of water from one spring tide to the next. The new pumps permit the necessary make-up to be drawn from the sea, thus keeping up the water-level during the neap tide periods and enabling vessels of deeper draught to be dealt with. New inner lock gates were provided at Barry and Port Talbot; the outer gates of the south lock, Newport, were completely overhauled; and improved accommodation was provided for ocean liner passengers at Plymouth.

Important improvements and extensions are being undertaken by the L.N.E.R. at Hull and Grimsby. At Hull, the St. Andrews fish dock is being extended westwards to a length of 1,250 ft., giving an increased water area of 5 acres. The accommodation at Grimsby is being enlarged by the provision of a new quay, with a two-storey market 790 ft. long, along the south side of No. 2 fish dock. A portion of the market on the south-west quay is also being reconstructed.

In March, 1936, the L.M.S.R. erected the first of six new electrically-operated belt conveyor coaling plants, forming part of an £85,000 improvement scheme at Fleetwood harbour. The new apparatus is capable of dealing with 20-ton wagons and is a great improvement on the previous method of bunkering trawlers by means of cranes and buckets. Improvement schemes were also taken in hand at Ayr, Barrow, Grangemouth, and Heysham.

The Southern Railway has practically completed the second stage of its Southampton docks extension scheme, and nearly the whole of the 400 acres of land reclaimed from tidal mud flats is now available for industrial development. Twenty-six miles of railway, including sidings, have been provided on the new estate, roads are being made, and drainage arrangements are rapidly being completed.

Edgware Tube Overcrowding

Increasing Edgware seating by 40 per cent.—Aldenham extension primarily for new rolling-stock depot—Stanmore line fare considerations

Keen public interest, and often resentment, has been expressed freely in the daily press recently at the overcrowding, and sometimes delays, experienced during peak-hour traffic on the northern section of the Morden-Edgware line. A comprehensive statement on the matter was made on Monday last in a letter to the Editor of *The Times* from Mr. Frank Pick, Vice-Chairman of the London Passenger Transport Board, which we reproduce:—

"It is somewhat unfortunate that a matter which is before Parliament and will be considered judicially by a Parliamentary Committee should have become the subject of outside controversy. The board feel that as there is so much misunderstanding of their intentions, some reply from them should be given at this time.

"The board are aware of the congestion of traffic at and beyond Golders Green upon the Edgware-Morden line in the peak hours. It was the fact of this congestion which directed the board's attention to securing some means of relief. It is proposed, under the programme of works now in execution, to extend the Highgate branch of the Edgware-Morden line northwards to make a junction with the L.N.E.R. at East Finchley, so as to allow of through services of trains from this line to be run to Barnet and to Edgware over the L.N.E.R. tracks, and in order to ensure that as full a service as possible shall be given to Edgware it is proposed to double the tracks upon this line. The effect of providing this additional through service of trains northwards will be that at Church End, Finchley, probably a quarter of the traffic which now converges at Golders Green will be diverted to the new service of trains, thus affording immediate relief. At Edgware there will be available two services of trains, one via Golders Green, the other via Highgate, both serving the West End and the City.

"At the same time the board propose to replace the rolling stock on the existing Edgware-Morden line with trains of a new type which will afford 14 per cent. more seating capacity than is now available. The combined effect of this programme will be to provide 40 per cent. additional seating accommodation in the services for the area in question.

"The extension of the railway from Edgware to Aldenham is necessary primarily to provide a new rolling-stock depot. Provision must be made for approximately 550 new cars. The existing provision at Golders Green, Edgware, and Wellington sidings is wholly inadequate for the purpose. Without a new depot it will be impossible to work the northern railways efficiently.

"The built-up area has now extended much beyond Edgware, and the provision of the extension to Aldenham will deal with an existing traffic more conveniently. The extent to which the territory beyond Aldenham is to be developed is in the hands of the local and town-planning authorities. The board would be glad if the Green Belt were completed across the Aldenham station, as it would afford to the board another type of traffic which would not demand facilities in the peak hours, and the board are prepared in their works at or near Aldenham to give careful regard to the amenities of the district.

"The board are also aware of the disparity in the fares charged at Stanmore upon the Stanmore branch of the late Metropolitan Railway and the fares charged at Edgware on the Edgware-Morden line. The fares on the late Metropolitan Railway are governed by the Railways Act of 1921 and are dealt with in the same way as the main-line railway companies' fares. The fares on the Edgware-Morden line are governed by the several Acts establishing the Underground Railways. There are difficulties in the way of equating these fares. The board are in negotiation with the main-line railway companies interested and hope that some adjustment will be possible which will result in making more effective the railway at Stanmore, especially as works are already being executed which will enable a through service of trains from the Bakerloo line to be run to Stanmore, giving from this point yet another direct service to and from the City and West End as at Edgware.

"It is idle to take a part of the board's programme and discuss it in isolation. If the whole of the works which the board has in contemplation in the northern sector of London are considered in their relationship to one another there is not any question at all that a quite considerable improvement in the travelling facilities of the area will be provided. Altogether the board are spending in this connection a sum of no less than £13,000,000."

Mr. Norman Crump in a letter to *The Times* on April 15 contends that even if a proportion of passengers now joining the Edgware line at Edgware and Golders Green would be diverted to the Highgate line that would not reduce the total number of passengers travelling to the West End along the Camden Town to Charing Cross bottle-neck. On the contrary they would be reinforced by the full body of passengers from Barnet to the West End. The real crux was the Camden Town to Charing Cross bottle-neck, which was already working at capacity, and the only remedy was to build four tracks in place of the existing two. There should be co-ordination of tube and surface line fares.

The "Stay-in Strike"

An incidental aspect of the situation was that on April 5, when some passengers on a late train were asked to change trains at Colindale, they refused to alight and were shunted into a siding. The following explanation of the occurrence was published in *The Times* of April 7 over the signature of Mr. E. Rawdon Smith, Public Relations Officer of the London Passenger Transport Board:—

"The report which appears in your issue of this morning (April 6) of a 'stay-in strike' on the part of passengers on the arrival of the 11.25 p.m. train at Colindale deserves an explanation.

"Owing to the breaking of a side spring on a truck belonging to the maintenance staff, the whole of the 'train stops,' which actuate the trip-cock safety device, between Edgware and Golders Green were broken off. It was found impossible to replace all the trip gear before the evening owing to the close headway which is operated on this line. Consequently station to station operation by telephone had to be continued.

"The very short intervals between trains on the tube railways necessitate precise operation—what may appear a trivial matter to the public sometimes throws out of balance the fine adjustment necessary in running underground railway services. As it was, this unfortunate mishap caused a certain amount of irregularity and it is felt that it is to the credit of the operating staff that so little confusion was caused.

"The train in which the trouble arose was due, in accordance with the emergency schedule, to reverse at Colindale in order to preserve the southbound interval. It is necessary that trains be taken into the sidings when they are so booked.

"If on such rare occasions passengers make demands for the continuation of trains which should be turned short of their destination to ensure proper running, a very delicate train schedule will become unbalanced, causing considerable and widespread disorganisation. The majority of the passengers appreciated the position and alighted when requested to do so. It could not be expected that the train should be held back while a few travellers argued with the officials, and the only alternative in this case was to stable the train in the siding."

L.P.T.B. £40,000,000 Scheme

An official statement issued by London Transport on April 9 says that increased, and in some instances, still increasing costs have made it impossible for the London Passenger Transport Board and the main-line companies to engage upon any new works, and the board may be faced with the necessity of curtailing the £40,000,000 programme of new works of importance. Extension of the Bakerloo tube to Camberwell is postponed.

STAFF AND LABOUR MATTERS

Salaried and Conciliation Grades—New Rail Wage Claims

At the end of last week the three railway trade unions presented, on behalf of salaried and conciliation grades, important new wage claims to the main-line railway companies. All three unions asked for the cessation of the present deduction of 1¼ per cent. from all earnings. The National Union of Railwaymen asked in respect of salaried and conciliation grades for:—

(1) The complete restoration of the standard rates of payment in operation prior to National Wages Board Decision No. 119, dated March 5, 1931, in respect of overtime, night duty and Sunday duty.

(ii) The minimum rate of wages payable to any adult to be not less than 50s. per week.

On behalf of the drivers, motormen, firemen, and engine cleaners, the Associated Society of Locomotive Engineers and Firemen made claims for:—

(i) Restoration of the standard rates of payment in operation prior to National Wages Board Decision No. 119 of March 5, 1931, for night duty and Sunday duty.

(ii) After twelve months' service two weeks' holiday—twelve weekdays—with full pay to be given, annually.

(iii) Cancellation of the provision for an extension of rosters, where economy will accrue, up to nine hours a day.

(iv) A guaranteed day for each time of signing on duty on Sundays.

The Railway Clerks' Association asked for:—

(i) Special increases in pay for those for whom promotion is not available.

(ii) Reduction of hours of duty to thirty-six per week—Sunday turns not to form part of the week's work and split turns to be abolished.

(iii) Extra payment for time worked between 6.0 p.m. and 6.0 a.m.

(iv) Time off in lieu of work on Bank and Public holidays.

Mr. Marchbank, writing in *The Railway Review*, dated April 9—the day the programmes reached the companies—said "It must be understood that the railway unions are in earnest in putting forward this programme. There is no element of bluff. As far as the National Union of Railwaymen is concerned, we have given careful consideration to all aspects of the situation, including the financial recovery of the railways and their improving prospects; and also the rising tendency of prices for household commodities. This latter factor is a most important aspect of the general wage movement which trade unions are now conducting. The rise in the cost of living index has been continuous and rapid. . . . . Unless money wages are increased substantially, and at once, the wage-earner gets no benefit from the revival of trade and the prosperity it has brought; on the contrary, he is worse off than he was when the depression was on. Such a position is intolerable. It is, moreover, inequitable that the wage-earner should be denied his fair share of the revival which is adding so heavily to the profits of industrial enterprise. Application of these very pertinent considerations of economic justice and fair dealing will be made, our members can depend upon it, when we present our case to the railway companies."

We understand that an early meeting will be arranged between the representatives of the unions and the railway companies to discuss these claims.

Railway Shopmen—New Wage Claim

The employees' side of the National Railway Shopmen's Council—representative of all the trade unions parties to the agreed machinery of negotiation for railway shopmen—have submitted to the railway companies the following claims:—

(i) That the present deduction of 1¼ per cent. from earnings shall cease.

(ii) That the base rates and war wage be consolidated.

(iii) That the rates of pay shall be increased by 1d. an hour, and that in no case shall the base rate be less than 50s. a week.

(iv) That 40 hours shall constitute a standard week's work, without any reduction in pay.

(v) That each employee be guaranteed a day's pay for each day he is available for duty, and that each employee be guaranteed a standard week's pay.

(vi) That each employee be allowed twelve working day's holiday with pay per annum.

A meeting of the full council will probably be held during the next week or two.

QUESTIONS IN PARLIAMENT

Overcrowded Trains

Mr. G. C. Touche (Reigate—C.) on April 8 asked the Minister of Transport whether he had considered the resolution from the Dorking Urban District Council regarding the serious overcrowding of railway trains in the London area, and particularly as regarded trains running between Dorking and London; and whether he would make representations to the Southern Railway Company on the subject.

Mr. L. Hore-Belisha (Minister of Transport): I have already brought the resolution to the notice of the Southern Railway Company.

Overcrowding on Edgware Line

Mr. W. J. Kelly (Rochdale—Lab.) on April 12 asked the Minister of Transport if he was aware of the danger to health and the liability to injury arising from the overcrowding which took place each day on the Hampstead—Edgware Line; and whether he would take steps to have the matter remedied.

Mr. Hore-Belisha (Minister of Transport): I understand from the board that certain steps have been taken.

Railway Companies and Air Line Passengers

Mr. W. R. D. Perkins (Stroud—C.) on April 13 asked the Prime Minister whether he was aware that British railway companies through their booking agents were encouraging British subjects to fly by foreign air lines in preference to British air lines; and whether he would allow the House an opportunity to discuss the matter.

Sir John Simon (Home Secretary): I would remind my hon. friend that this matter was debated on two occasions when the Air Estimates were before the House, the last occasion being so recent as March 22. I do not think there is any difference of opinion in the House on the subject.

Railway Finance Corporation

Mr. A. Short (Doncaster—Lab.), on April 14 asked the Secretary to the Treasury, what was the financial allocation to the various railway companies under the Railway Finance Corporation set up under the Railway Agreement Act, 1935, and the amount absorbed in each case.

Lieut.-Colonel D. J. Colville (Financial Secretary to the Treasury): The amount raised by the Railway Finance Corporation under the Railways (Agreement) Act, 1935, was £26,190,000. The railway companies borrowed this sum from the Finance Corporation in the following proportions:—

G.W.R.	...	...	£5,435,660
L.M.S.R.	...	...	£8,894,717
L.N.E.R.	...	...	£5,929,811
S.R.	...	...	£5,929,811

If by the amount absorbed in each case the Hon. Member means the amount actually transferred in cash by the Finance Corporation to each of the railway companies, I am afraid that the quotation of any such figures would be misleading for the reason that certain of the railway companies have, pending the actual expenditure from time to time of the moneys borrowed upon the works authorised to be carried out, left a portion of the moneys borrowed with the corporation.

Doncaster Station Improvements

Mr. A. Short (Yorkshire, W. Riding, Doncaster—Lab.) on April 14 asked the Minister of Transport whether he was aware that, owing to the rising costs of steel and other materials, the railway companies were considering the abandonment or modification of the improvement schemes scheduled under the Railway Agreement Act, 1935.

Mr. Hore-Belisha: I have received no application for variation or postponement. The preliminary work relating to the improvements to Doncaster station is proceeding.

NOTES AND NEWS

Dinner of the Institute of Transport, 1938.—The Institute of Transport announces that its next dinner will take place at the Connaught Rooms, Great Queen Street, London, W.C.2, on Friday, March 4, 1938.

San Paulo (Brazilian) Railway.—The board recommends a final dividend on the ordinary stock of 3 per cent., making 5 per cent. for the year 1936, free of tax. For each of the years 1935 and 1934 the dividend was 2½ per cent., tax free.

Collision Near Victoria Station, S.R.—The inquest into the death of the driver of the empty electric train which collided with a shunting engine at Ebury Bridge sidings, Victoria, on April 5 was held at Westminster on April 9. The jury returned a verdict of accidental death.

Paddington Station Coronation Decorations.—Paddington station is to be decorated by the G.W.R. for the Coronation. A feature of the scheme will be the use of masses of red, white, and blue flowers in hanging baskets and around the pillars which will convert the "Lawn" into a floral garden.

L.M.S.R. Electric Stock.—A total of 59 new motor-coaches and 93 trailers are to be acquired by the L.M.S.R. for service on the Liverpool-Southport electrified line. The new vehicles will be of the saloon type and will be built on the same principles as those now under construction for the Wirral section.

Exhibition of L.N.E.R. Poster Art.—The twelfth exhibition of L.N.E.R. poster art will be held in the New Burlington Galleries, Burlington Gardens, W.1, from May 4 to 14, with the exception of Coronation Day. The exhibition will be opened at 2.15 p.m. on May 4 by the Rt. Hon. Leslie Hore-Belisha, P.C., M.P., Minister of Transport.

Edgware-Aldenham Extension.—The Hendon Borough Council has decided to discontinue its opposition to the proposal in the London Passenger Transport Board Bill for the extension of the Morden-Edgware line to Aldenham. The council feels bound to concur with the view of the board that with the contemplated extensions there will be a definite improvement of the conditions existing in Hendon. It will, however, keep in mind the equalisation of fares as between the Edgware and the Stanmore lines.

Mishap to the Up Irish Mail at Crewe.—On April 14 two vehicles of the up day Irish mail from Holyhead to Euston were derailed. It appears that the train was running into Crewe station probably at about 15 m.p.h. when a restaurant car and a kitchen car left the rails. The left hand wheels of the coaches that were damaged appeared to run up the platform ramp to the left of the arrival line and the bodies of the coaches struck the station roof support. The cars were badly damaged and a number of passengers hurt. The damaged coaches were taken off and the train left Crewe running 22 min. late.

Increased Rates and Fares in Belgium.—On page 456 in our issue of March 5, the increase of fares was erroneously stated to be 50 per cent.; the figure should have read 5 per cent.

Large South African Locomotive Order.—The South African Railways & Harbours Administration has placed an order with Beyer, Peacock & Co. Ltd., for sixteen Beyer-Garratt articulated steam locomotives; the approximate value of the order is £250,000. These engines, which will be built to a maximum axle load of 15 tons, are to have the 4-8-2 + 2-8-4 wheel arrangemant, and will be the most powerful in the world on a 60-lb. rail. Further details are given on our Contracts and Tenders page.

Easter Traffic in Switzerland.—In spite of very bad weather on Good Friday and the following morning in most parts of the country, the Federal and the principal private railways handled larger numbers of passengers during the Easter holidays this year than in 1936. The increase of visitors from abroad was particularly noticeable, the largest contingent being that from England by four "Swiss Specials" which arrived on Good Friday. The recent improvements to the Alsace-Lorraine section of Basle station contributed appreciably to the smooth handling of the additional traffic there. A railcar of the French Eastern Railway made its appearance in the Bernese Oberland, conveying a special party from Paris. Numerous expresses had to be run in several sections, and many special trains were provided between the principal centres.

Inter-Railway Ambulance Competition.—On account of the Coronation, it has been necessary to fix the date of the Inter-railway ambulance competition earlier than usual, and it will be held on Thursday, April 22, at the Wharncliffe Rooms, Marylebone. The nine competiting teams, selected from the grouped railways by a series of competitions organised by each company, and in the case of the ungrouped companies by a preliminary competition arranged by the St. John Ambulance Association, are as under :—

L.N.E.R.—Parkeston, Newcastle Tyne Dock.
G.W.R.—Cheltenham, Newport, High Street.
S.R.—Waterloo A, Horsham.
L.M.S.R.—Two teams to be selected at Final competition on April 16.
Ungrouped.—Cheshire Lines Committee.

The adjudicator at the St. John Ambulance Association preliminary competition was Dr. M. M. Scott, M.R.C.S., L.R.C.P. of London, and the adjudicators for the final contest will be Lieut.-Col. W. Archibald, T.D., M.D., of Luton, for the team test, and Lieut.-Col. M. MacEwan, D.F., T.D., M.B., of Ipswich, for the individual tests. It is hoped that Mr. R. Holland-Martin, C.B., Chairman of the Southern Railway, will make the presentation of the Challenge Shield of the St. John Ambulance Association and prizes at the conclusion of the competition.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the 28 days of February, 1937, amounted to $9,725,000, an increase of $444,000 in comparison with the 29 days of February, 1936. In the working expenses of $8,734,000 there was an increase of $321,000, leaving net earnings $123,000 higher, at $991,000. Aggregate gross earnings for the first two months of 1937 were $19,919,000, an improvement of $1,315,000, and the net earnings of $1,905,000 were higher by $425,000.

Canadian National Earnings.—For the 28 days of February, 1937, gross earnings of the Canadian National Railways amounted to $14,301,856, an increase of $1,235,349 over the 29 days of February, 1936. Operating expenses ($13,829,962) advanced by $474,995, to leave net earnings of $471,894, which were $760,354 higher than for February, 1936. Aggregate gross earnings from January 1 to February 28, 1937, were $28,345,208, an improvement of $2,536,147, and the net earnings for the two months were $555,116, against a deficit of $864,791 for the corresponding period in 1936.

Royal Trains.—In the course of the editorial article on "Royal Trains" on page 692 of last week's issue of THE RAILWAY GAZETTE, reference was made to the fact that some years ago it was decided that only the L.M.S.R. and L.N.E.R. should keep Royal trains in commission, and that these should be lent to other companies when necessary. Continuing, the article stated that on March 18-20, King George VI made his first journey as King in one of these, travelling from Euston to Huyton on the first date to see the Grand National and returning from Liverpool. It should have been stated that this was the present King's first journey in the L.M.S.R. Royal train and that his first journey as King in the L.N.E.R. Royal train was made on December 22, 1936, when the Royal family travelled from King's Cross to Wolferton (for Sandringham) in connection with their Christmas holiday. They returned to King's Cross, also in the L.N.E.R. Royal train on January 29, 1937.

Institution of Railway Signal Engineers.—A large party of members assembled at York on Wednesday afternoon, April 14, and visited the L.N.E.R. signal shops and school. They were entertained afterwards to tea by the railway company and welcomed by Mr. F. E. Harrison, Engineer, and Mr. C. Carslake, Signal and Telegraph Engineer, North Eastern area. In the evening

a paper was read on "Training of Maintenance Staff for Signal and Telegraph Work," by Mr. J. H. Fraser, Assistant Signal and Telegraph Engineer. In the discussion the following spoke: Messrs. C. Carslake, R. S. Griffiths, M. G. Tweedie, F. Downes, W. S. Roberts, H. B. Longden, A. W. Rogers, H. H. Dyer, A. W. Drew, D. Old, F. H. Hodgson, A. Moss, F. C. Ward, W. S. Every, H. E. Morgan, and the President, Mr. H. M. Proud. A special meeting will be held in London on April 28, for associate members and students only, to hear the 1936 Students' Prize Essay "Power Signalling," by P. S. Bennett. The next general meeting will be in London on May 26.

Naming Formality at Paddington Station.—A colourful ceremony took place on No. 4 platform, Paddington station, at 12.30 p.m. last Wednesday, when the "Castle"-class locomotive No. 4037 received the name *South Wales Borderer*. Major-General L. I. G. Morgan-Owen, Colonel of the South Wales Borderers, unveiled the nameplate of the locomotive, which had been handsomely decorated for the occasion with flags. He then presented the driver and fireman each with a silver mug as a memento of the ceremony. Sir Robert Horne welcomed the Colonel and other representatives of the regiment on behalf of the Great Western Railway Company. Later in the day *South Wales Borderer* left Paddington in appropriate charge of the 3.55 p.m. South Wales Express.

Locomotive Naming Ceremony at Euston Station.—On Saturday afternoon last, at Euston station, Brigadier H. Clementi Smith, D.S.O., Colonel Commandant of the Royal Corps of Signals, named the L.M.S.R. "Patriot" class locomotive No. 5504 *Royal Signals* by unveiling the nameplate surmounted by the regimental badge and breaking a bottle of wine on the running plate. The ceremony was performed with military honours, a special guard of the London Corps of Signals being present. Mr. W. A. Stanier, Chief Mechanical Engineer of the L.M.S.R., welcomed the Corps on behalf of the railway company.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 14th Week			Totals to Date		
	1937	1936	Inc. or Dec.	1937	1936	Inc. or Dec.
L.M.S.R. (6,877 mls.)	£	£	£	£	£	£
Passenger-train traffic...	421,000	668,000	− 247,000	5,703,000	5,601,000	+ 102,000
Merchandise, &c. ...	532,000	423,000	+ 109,000	6,730,000	6,591,000	+ 139,000
Coal and coke ...	293,000	226,000	+ 67,000	3,983,000	3,837,000	+ 146,000
Goods-train traffic ...	825,000	649,000	+ 176,000	10,713,000	10,428,000	+ 285,000
Total receipts	1,246,000	1,317,000	− 71,000	16,416,000	16,029,000	+ 387,000
L.N.E.R. (6,320 mls.)						
Passenger-train traffic...	276,000	394,000	− 118,000	3,765,000	3,678,000	+ 87,000
Merchandise, &c. ...	368,000	288,000	+ 80,000	4,627,000	4,546,000	+ 81,000
Coal and coke ...	268,000	204,000	+ 64,000	3,616,000	3,569,000	+ 47,000
Goods-train traffic ...	636,000	492,000	+ 144,000	8,243,000	8,115,000	+ 128,000
Total receipts	912,000	886,000	+ 26,000	12,008,000	11,793,000	+ 215,000
G.W.R. (3,738½ mls.)						
Passenger-train traffic...	183,000	269,000	− 86,000	2,387,000	2,339,000	+ 48,000
Merchandise, &c. ...	221,000	172,000	+ 49,000	2,699,000	2,638,000	+ 61,000
Coal and coke ...	122,000	94,000	+ 28,000	1,615,000	1,535,000	+ 80,000
Goods-train traffic ...	343,000	266,000	+ 77,000	4,314,000	4,173,000	+ 141,000
Total receipts	526,000	535,000	− 9,000	6,701,000	6,512,000	+ 189,000
S.R. (2,153 mls.)						
Passenger-train traffic...	276,000	394,000	− 118,000	3,696,000	3,563,000	+ 133,000
Merchandise, &c. ...	63,500	56,500	+ 7,000	801,000	842,500	− 41,500
Coal and coke ...	30,500	24,500	+ 6,000	473,000	497,500	− 24,500
Goods-train traffic ...	94,000	81,000	+ 13,000	1,274,000	1,340,000	− 66,000
Total receipts	370,000	475,000	− 105,000	4,970,000	4,903,000	+ 67,000
Liverpool Overhead ... (6½ mls.)	1,191	1,072	+ 119	16,483	15,546	+ 937
Mersey (4½ mls.) ...	4,220	4,171	+ 49	59,843	57,556	+ 2,287
*London Passenger Transport Board ...	575,600	525,700	+ 49,900	22,929,900	22,250,500	+ 679,400
IRELAND						
†Belfast & C.D. pass. (80 mls.)	1,767	2,057	− 290	24,825	25,717	− 892
,, ,, goods	541	558	− 17	7,094	8,084	− 990
,, ,, total	2,308	2,615	− 307	31,919	33,801	− 1,882
Great Northern pass. (543 mls.)	9,250	10,300	− 1,050	117,850	113,400	+ 4,450
,, ,, goods	9,850	11,150	− 1,300	129,750	145,450	− 15,700
,, ,, total	19,100	21,450	− 2,350	247,600	258,850	− 11,250
Great Southern pass. (2,075 mls.)	29,753	34,252	− 4,499	391,350	388,193	+ 3,157
,, ,, goods	44,831	42,209	+ 2,622	584,449	595,280	− 10,831
,, ,, total	74,584	76,461	− 1,877	975,799	983,473	− 7,674

*41st Week. † 15th Week. Good Friday, 1936

British and Irish Railway Stocks and Shares

Stocks	Highest 1936	Lowest 1936	Prices April 14, 1937	Rise/Fall
G.W.R.				
Cons. Ord. ...	64¼	45½	57½	—
5% Con. Prefce. ...	126½	116¾	113	+1½
5% Red. Pref. (1950)	113	108½	110½	—
4% Deb.	119½	110½	106	+½
4½% Deb.... ...	121	114	109	+1
4½% Deb.... ...	129	121	115½	—
5% Deb.	141	134	127½	+1
2½% Deb.... ...	79⅛	74	66½	—
5% Rt. Charge ...	136½	130	125½	+1½
5% Cons. Guar. ...	135¼	127¾	121½	+2
L.M.S.R.				
Ord.	35⅝	17	29	−½
4% Prefce. (1923)	83	52½	74½	—
4% Prefce. ...	92¾	81	82	−1
5% Red. Pref. (1955)	109¼	103¼	103½	—
4% Deb.	111¾	105 9/16	103½	+1
5% Red. Deb. (1952)	119⅝	115½	113½	—
4% Guar. ...	106¾	101⅝	100	—
L.N.E.R.				
5% Pref. Ord. ...	14	9	9¾	−¼
Def. Ord.	7¼	4¾	5	—
4% First Prefce.	79¼	55¼	66½	−½
4% Second Prefce.	31⅞	18¼	23	−1
5% Red. Pref. (1955)	100½	77¾	91	—
4% First Guar. ...	104½	98¾	95	+½
4% Second Guar.	99	90	88	+½
3% Deb.	85¾	79	77½	+1
4% Deb.	109¾	104½	102	+1
5% Red. Deb. (1947)	116¼	110½	107½	—
4½% Sinking Fund Red. Deb.	111½	107½	107½	—
SOUTHERN				
Pref. Ord.... ...	98¾	82½	89	+½
Def. Ord.	27⅝	20⅛	23	+½
5% Pref.	120¾	118½	111	+2
5% Red. Pref. (1964)	119¾	115¼	112½	+1
5% Guar. Prefce.	136	129½	121½	+2
5% Red. Guar. Pref. (1957)	120	115¾	112½	—
4% Deb.	117 5/16	109½	105½	+1½
5% Deb.	140	134	126½	+2
4% Red. Deb. 1962–67	116½	110	109	+1
BELFAST & C.D.				
Ord.	9	4½	4	—
FORTH BRIDGE				
4% Deb.	107	105	102½	—
4% Guar. ...	107 5/16	104	101½	—
G. NORTHERN (IRELAND)				
Ord.	19½	9¾	9¼	−¾
G. SOUTHERN (IRELAND)				
Ord.	63	41	48½	—
Prefce.	65	46	54	—
Guar.	97¼	81	77	−1
Deb.	99¾	83¼	90½	+⅛
L.P.T.B.				
4½% "A" ...	127¾	121	114½	+1
5% "A"	138¼	133½	124½	—
4½% "T.F.A." ...	111½	108⅛	107	+1
5% "B"	131¾	123¾	119½	—
"C"	112½	93	90	+½
MERSEY				
Ord.	40¾	23	33½	—
4% Perp. Deb. ...	103	98	99	—
3% Perp. Deb. ...	78	74⅝	75½	—
3% Perp. Prefce.	68⅞	63¼	62½	—

CONTRACTS AND TENDERS

D. Wickham & Co. Ltd. has received an order from the Midland Uruguay Railway for 11 petrol-driven gang trolleys.

Articulated Locomotives for South Africa

Beyer, Peacock & Co. Ltd. has received an order from the South African Railways & Harbours Administration for sixteen Beyer-Garratt articulated steam locomotives; the approximate value of the order is £250,000. These engines, which will be built to a maximum axle load of 15 tons, are of the 4-8-2 + 2-8-4 wheel arrangement. The total weight of each locomotive is approximately 180 tons and with a tractive effort of 60,000 lb. at 75 per cent. boiler pressure it will be the most powerful in the world on a 60-lb. rail. The diameter of the coupled wheels will be 4 ft. 6 in. A mechanical stoker will be used.

Herbert Morris Limited has received an order from the Bengal-Nagpur Railway for one three-ton overhead electric travelling crane.

Richard Costain Limited has received a contract from the London Passenger Transport Board for alterations to Swanley garage and the erection of new offices. Work will begin immediately and will occupy four months. A new side entrance into the garage will be built to facilitate the movement and handling of buses and coaches in the garage. The office block, 135 ft. by 22 ft., will be built on the west wing. It will include a canteen and other rooms for the staff. A public enquiry office will be provided.

The South Indian Railway Administration has placed the following orders to the inspection of Messrs. Robert White & Partners:

Fernand Espir, 16 copper plates.
Linley & Co., 20 copper plates.
Mannesman Trading Company, 994 solid drawn steel superheater smoketubes.
Banting & Tresilian, 3,347 solid-drawn steel tubes.

Walker Brothers (Wigan) Limited has received an order for two diesel railcars from the Peruvian Corporation.

S. A. Gilsoco has received orders from the Bombay, Baroda & Central India Railway Administration, to the inspection of Messrs. Rendel, Palmer & Tritton, for 30,000 sleeper end bolts and 370 hook bolts.

The Government of Mysore, Stores Purchase Committee, Bangalore, has placed the following orders for machine tools:—

T. E. Thomson & Sons, one sawing machine.
Alfred Herbert (India) Limited, one capstan lathe, one boring, milling, and tapping machine and magnetic separators.
William Jacks & Co., one Linsher grinder, and one sand mixing machine.
Craven Bros., one quartering and one scragging machine.
A. C. Bottomley & Co., one motor-driven Pallas machine and four shaping machines.
Turner, Hoare & Co., one motor generating set.
W. H. Brady & Co., one three-ton Morris overhead crane.

The L.N.E.R. has placed orders with various firms in the West Riding of Yorkshire, Lancashire, and Somerset for 57,900 yards of cloth, 152,500 yards of serge and 325,000 yards of blue jean required for uniforms, overalls, and so forth.

C. & T. Painters Limited and Arundel (Contractors) Limited have received contracts from the L.N.E.R. for the cleaning and painting of the external elevations, and roof, at Liverpool Street station.

The General Electric Co. Ltd. has received orders from the L.N.E.R. and the L.M.S.R. respectively for 12 months supply of Osram lamps.

The Gaekwar's Baroda State Railway Administration has placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton:—

Vulcan Foundry Co. Ltd., Three sets of locomotive wheels and axles.
Craven Bros. (Manchester) Ltd., One axle journal returning lathe.
Wilson Lathes Limited, One 10½-in. centring lathe.
Hancock & Co. (Engineering) Limited, One oxy-acetylene flame-cutting and profiling machine.

The Quasi Arc Co. Ltd. has received an order for 363,800 electrodes for use in bridge strengthening work for the Central Uruguay Railway.

W. G. Bagnall Limited has received an order through Greaves, Cotton & Co. for the supply of two superheated locomotive boilers required for 2-ft. 6-in. gauge 2-8-2 locomotives for the Great Indian Peninsula Railway.

The Government of India, Railway Department (Railway Board) has placed the following orders for the 1937-8, 1938-9 and 1939-40 requirements for broad-gauge general service wagons:—

	Type	1937–8	1938–9	1939–40
Braithwaite & Company:				
B.B. & C.I.R.	O	65	—	—
M. & S.M.R....	O	44	—	—
E.I.R. ...	O	161	300	300
N.W.R. ...	O	100	100	100
E.B.R. ...	O	—	20	—
Burn & Company:				
E.I.R. ...	O	334	—	—
E.B.R. ...	OM	40	70	50
B.B. & C.I.R.	OM	—	20	50
B.N.R. ...	CR	—	490	525
M. & S.M.R....	CMR	55	—	—
N.W.R. ...	CMR	—	50	50
Indian Standard Wagon Company:				
N.W.R. ...	CMR	600	200	200
E.I.R. ...	CMR	—	250	250
Jessop & Company:				
B.B. & C.I.R.	CR	178	75	120
E.B.R. ...	CR	100	100	200
G.I.P.R. ...	CR	73	215	130
B.N.R. ...	CR	250	110	75
M. & S.M.R....	CR	—	—	95

The Patent Shaft & Axletree Co. Ltd. has received an order for 380 rail bearers required for bridge strengthening for the Central Uruguay Railway.

The Bombay, Baroda & Central India Railway Administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton with the Superheater Co. Ltd. for four superheater headers, and with the Glasgow Railway Engineering Co. Ltd., for 486 wagon wheels and axles.

As recorded in our Notes and News section the L.M.S.R. is to acquire 59 new electric motor-coaches and 93 trailers for the Liverpool-Southport services.

Whitelegg & Rogers Limited has received the following orders: Ajax hard and soft grease lubricating equipments for four new "PT" Class locomotives, under construction by Robert Stephenson & Co. Ltd., for the South Indian Railway; 126 sets Ajax axle-box grease lubricators for application to existing locomotives, Jodhpur Railway; and 44 Ajax hard grease pumps for India.

The South Indian Railway Administration has placed the following orders to the inspection of Messrs. Robert White & Partners:—

Wm. Beardmore & Co. Ltd., 36 steel axle billets.
Surhamer Bruks A.B., 72 steel locomotive tyres.
John Spencer & Son (1928), Ltd., 232 helical and volute springs.
A. A. Jones & Shipman Limited, one grinding machine.

Taylor Brothers & Co. Ltd. has received an order for 240 pairs of wheels and axles for petroleum tank wagons and cattle wagons, from the Central Argentine Railway.

The Butler Machine Tool Co. Ltd. has received an order from the Chinese Government Purchasing Commission, to the inspection of Messrs. Fox & Mayo for one electrically driven shaping machine required for the Canton-Hankow Railway.

Thos. Firth & John Brown Limited has received an order from the Madras & Southern Mahratta Railway Administration to the inspection of Messrs. Rendel, Palmer & Tritton for 64 carriage and wagon and 50 locomotive tyres.

Alex. Findlay & Co. Ltd. has received an order for two steel plate girder through spans from the Central Uruguay Railway.

Tenders are invited by the Sudan Railways, receivable by April 28 at Wellington House, Buckingham Gate, S.W.1, for the supply of 120,000 tons of locomotive coal.

The South African Railways & Harbours Administration is calling for tenders (No. 1265) for the supply and delivery of: One 10-ton self-propelling swing-jib steam-driven travelling crane, arranged on an underframe mounted on three pairs of wheels and axles, and capable of being operated on permanent way tracks, 3 ft. 6 in. gauge. Tenders should reach the Secretary to the Tender Board, South African Railways headquarter offices, Johannesburg, by April 26, 1937.

The management of the Associated Equipment Co. Ltd., as well as closing the factory at Southall, Middlesex, where nearly 3,000 persons are engaged, on May 12, for the Coronation celebrations, is also making every employee a free and unconditional gift of a day's pay.

OFFICIAL NOTICES

G.W.R. Signalling Power Plant

The Great Western Railway has just installed a diesel stand-by set for the signalling system at Paddington, which comes into operation should the supply from the grid fail. The set was supplied by Austinlite Limited, and consists of a 150-b.h.p. Paxman-Ricardo engine driving a 150-kW. alternator with a rating of 450 volts 217 amp. at 1,500 r.p.m. Should any failure occur in the substation at Paddington the attendant merely presses a button and the emergency set comes into operation. The normal period elapsing between pressing the button and full load being available is about 7 sec., and Mr. F. H. D. Page, the Signal Engineer of the Great Western Railway, told a gathering of press representatives and engineers on Wednesday last that the G.W.R. had similar stand-by sets at Bristol and Cardiff, and in no case had more than 12 sec. elapsed before the complete signalling power was taken over by the stand-by plant. At Paddington the plant supplies emergency power for the signals from the London terminus to Southall. The Paxman engine is one of the maker's standard six-cylinder vertical types, and is fitted with C.A.V.-Bosch fuel pumps and filters and Serck sectional radiators. Safety devices include thermostatic control for the water-circulating system, and an oil-pressure relay which shuts down the plant in the event of a failure of the lubricating oil system.

Parliamentary Notes

L.M.S.R. Bill

When the L.M.S.R. Bill as amended was considered on Report on April 8 Miss Megan Lloyd George (Anglesey—Lib.) raised a point relating to Part 3 of the Bill, which enabled the L.M.S.R. to establish a new schedule of port and harbour dues at Holyhead, or gave the company power which it did not possess at the moment to charge ordinary harbour dues for shipping using the port facilities for which the company held the lease. She said it was true there was a schedule to the Bill which laid down a scale of charges, but there was also a provision which enabled a revision of rates, either downwards or upwards, to take place, and it was also true that the revision was subject to the approval of the Minister. The Bill recognised the necessity for safeguards of some kind, because it provided that representations might be made to the Minister when the question of revision came up by any chamber of commerce or shipping or any representative body of traders or any dock or harbour authority who in the opinion of the Minister was a proper person for the purpose. At Holyhead there was no chamber of commerce or shipping, nor was there a representative body of traders, and the dock or harbour authority was the L.M.S.R. itself. Therefore she would like to have an assurance from the Minister that he would consider the Urban District Council as one of the persons entitled to make any representations.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport) said he could give Miss Lloyd George the definite assurance that the Urban District Council would be considered to be a proper person to apply to the Minister under Clause 34 for a revision of harbour charges.

Railway Bills

The L.N.E.R., L.M.S.R., and Southern Railway Bills were read the third time in the House of Commons on April 12.

Forthcoming Events

Apr. 16 (*Fri.*).—Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 6.30 p.m "The Wear of Cylinder Liners," by Mr. J. Hurst.

Apr. 19-24.—International Association for Testing Materials Congress, at Inst. of Civil Engineers, Great George Street, London, S.W.1.

Apr. 20 (*Tues.*).—Institute of Transport (London), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Transport Developments in 1936," by Mr. R. Bell.

Apr. 21 (*Wed.*).—Institution of Locomotive Engineers (London), at St. Ermin's Hotel, Caxton Street, S.W.1, 6 p.m. Lantern and Cinema Display of the German Visit, 1936.

Apr. 22 (*Thurs.*).—Institution of Electrical Engineers, Savoy Place, London, W.C.2, 6 p.m. Kelvin Lecture, by Prof. J. Chadwick.

Apr. 23 (*Fri.*).—Institute of Transport (Leeds Graduate), at City Transport Department, 7 p.m. Annual General Meeting.

L.M.S.R. (London) Dramatic Society, at Cripplegate Inst. Theatre, Golden Lane, E.C.1, 8 p.m. "Baa, Baa, Blacksheep."

Railway Students' Association (Edinburgh), 7.30 p.m. Annual General Meeting.

G.W.R. Final Ambulance Competition

The General Meeting Room at Paddington station was the scene of the G.W.R. final ambulance competition on Tuesday, April 6, when Dr. S. McCormac of Newport and Dr. W. J. Crawford of Southall judged the eight teams selected by the company's series of competitions in team work and individual work respectively. The original number of entries was 266 teams. The tests were well staged, that for team work representing a level crossing accident involving a lorry, while the individual tests included mishaps to a Zoological Gardens keeper and a taxi-cab passenger. The competition attracted a large number of keenly interested spectators, amongst whom were the Chairman, the Rt. Hon. Sir Robert Horne, G.B.E., K.C., the Deputy Chairman, and some of the chief officers of the company. The result of the competition, announced by the Centre Secretary, Miss C. A. Ault, was as under:—

	Marks
First, Directors' Challenge Shield and Prizes—Cheltenham ...	151½
Second, Carvell Cup and Prizes—Newport, High Street	145
Third, Prizes—Paignton	141
Fourth, Prizes—Barry	133½
Fifth—Swindon	128½
Sixth—Pilning	128
Seventh—Aberdare	127½
Eighth—St. Blazey	123½

Sir Robert was pleased to observe that the Directors' shield had been won by a team which had not previously secured the trophy, and whilst in no way discouraging those who had won before, he was of the opinion that this was for the good of the movement. He hoped a G.W.R. team would this year secure the challenge trophy of the St. John Ambulance Association in competition with the other principal railway companies. Sir Robert referred to the fact that what might be termed the industrial first aid movement began on the G.W.R. as long ago as 1878, and although it was soon followed by other railways and undertakings, it was gratifying to know that the G.W.R. was the pioneer of such a beneficial movement. Since then upwards of 150,000 members of the staff had qualified in first aid work.

Railway Share Market

Home railway stocks have reflected the rather better tendency which has developed in the stock and share markets. The past week's traffics compare with Good Friday week of last year and were therefore expected to show a substantial decrease. The market was prepared for an aggregate decrease of £250,000, and as the actual decline proved to be £159,000, the junior stocks were inclined to be influenced favourably. Chief attention was probably given to Southern deferred and preferred which are 22¾ and 88¾ respectively, the better demand being attributed to hopes that during the next few weeks the railway's receipts may benefit satisfactorily from the influx of visitors for the coronation. L.M.S.R. ordinary has been active around 29, and there was also a firmer tendency in the 1923 preference and 4 per cent. preference stocks. L.N.E.R. second preference was firmer at 23½ on satisfaction with last week's traffic figures. Great Western ordinary at 57½ was better than earlier in the week, sentiment having benefited from the growing belief that there is unlikely to be any serious labour trouble in the coal trade. Firmness of British Government stocks tended to be reflected in prior charges. Moderately higher prices were made by Southern 4 per cent. debentures and by Southern and Great Western 5 per cent. preference stocks. London Transport "C" was steadier at 89¾.

San Paulo was the chief feature of interest among foreign railway stocks, the price having improved to 97 on satisfaction with the 5 per cent., tax free, dividend. Fractional improvement was also shown by Leopoldina debentures. Among Argentine stocks best prices were not held, but B.A. Gt. Southern 5 per cent. and 6 per cent. preference stocks were relatively steady on the belief that their dividends are being earned. The ordinary stock also came into request on any decline, as a fractional payment was expected to be earned on this stock. B.A. Western 4½ per cent. second preference, which it is generally assumed will receive its full dividend for the current year, was fairly steady and some buying of the ordinary stock was reported on the possibility that resumption of dividends with a small payment may be possible this year. Elsewhere, Antofagasta was moderately lower at 25½. Canadian Pacific and American railroad stocks reflected the better tendency of New York markets.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1936-37	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1936	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1936	Prices: Lowest 1936	Prices: Apr. 14, 1937	Yield % (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	834	11.4.37	22,160	+ 8,600	15	251,510	203,300	+ 48,210	Ord. Stk.	25	15¼	26	Nil
	Argentine North Eastern	753	10.4.37	8,244	+ 1,041	41	355,258	318,890	+ 36,368	,,	12	2	11	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	54	45	85	4 11/16
	Bolivar	174	Mar., 1937	6,100	— 1,500	13	17,200	19,750	— 2,550	6 p.c. Deb.	9	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	16	11½	16	3 19
	Buenos Ayres & Pacific	2,806	10.4.37	125,310	+ 22,784	41	3,783,913	3,411,497	+ 372,416	Ord. Stk.	17½	6	13½	Nil
	Buenos Ayres Central	190	27.3.37	$108 400	+ $30,000	39	$5,596,600	$4,345,200	+ $1,251,400	Mt. Deb.	31½	11	38	Nil
	Buenos Ayres Gt. Southern	5,084	10.4.37	179,094	+ 57,884	41	6,178,058	5,385,526	+ 792,532	Ord. Stk.	31¾	13¾	31½	Nil
	Buenos Ayres Western	1,930	10.4.37	59,988	+ 11,751	41	2,006,219	1,835,044	+ 171,175	,,	29¾	11	26½	Nil
	Central Argentine	3,700	10.4.37	178,505	+ 69,521	41	6,287,955	4,919,015	+ 1,368,940	,,	32 9/32	8¾	30½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	21	4½	14½	Nil
	Cent. Uruguay of M. Video	273	3.4.37	13,795	— 136	40	497,197	438,442	+ 58,755	Ord. Stk.	7¾	3	11	Nil
	Do. Eastern Extn.	311	3.4.37	3,309	+ 895	40	94,356	81,043	+ 3,313	—	—	—	—	—
	Do. Northern Extn.	185	3.4.37	2,361	+ 625	40	66,185	56,988	+ 9,197	—	—	—	—	—
	Do. Western Extn.	211	3.4.37	988	+ 132	40	41,017	35,539	+ 5,478	—	—	—	—	—
	Cordoba Central	1,218	10.4.37	35,550	+ 14,570	41	1,294,100	1,149,910	+ 144,190	Ord. Inc.	5	1	5¼	Nil
	Costa Rica	188	Feb., 1937	17,026	+ 2,386	35	142,134	106,919	+ 35,215	Stk.	36½	32	37	5 8
	Dorado	70	Feb., 1937	15,800	+ 3,500	9	31,100	25,600	+ 5,500	1 Mt. Db.	107	101½	104½	5¾
	Entre Rios	810	10.4.37	12,438	+ 4,494	41	531 314	442,442	+ 88,902	Ord. Stk.	17	6	13½	Nil
	Great Western of Brazil	1,082	10.4.37	6,300	+ 100	15	122,200	139,800	— 17,600	Ord. Sh.	1/2	5/16	1/2	Nil
	International of Cl. Amer.	794	Feb., 1937	$523,550	+ $31,911	9	$1,040,129	$993,174	+ $46,955	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	1/2	–/6	1/2	Nil
	La Guaira & Caracas	22½	Mar., 1937	5,680	+ 1,370	13	16,875	12,960	+ 3,915	Stk.	9	3	7½	Nil
	Leopoldina	1,918	3.4.37	25,490	+ 5,994	14	307 031	250,033	+ 56,998	Ord. Stk.	10½	3½	7	Nil
	Mexican	483	7.4.37	$283,000	— $17,000	14	$1,382,800	$3,588,000	+ $794,800	,,	1¼	1/4	1	Nil
	Midland of Uruguay	319	Feb., 1937	8,320	+ 76	36	69,193	57,159	+ 12,034	,,	1½	1/8	1/2	Nil
	Nitrate	397	31.3.37	9,031	+ 535	13	47,333	44,465	+ 2,868	Ord. Sh.	63/6	41/9	2 11/16	Nil
	Paraguay Central	274	3.4.37	$3,534,000	+ $652,000	40	$109,840,000	$90,998,000	+ $18,842,000	Pr. Li. Stk.	85	71	82	7 16
	Peruvian Corporation	1,059	Mar., 1937	85,920	— 1,250	39	730,807	703,226	+ 27,581	Pref.	15	9	12	Nil
	Salvador	100	3.4.37	¢16,000	+ ¢18,750	40	¢935,508	¢782,496	+ ¢153,012	Pr. Li.Db.	18	16	22½	Nil
	San Paulo	153½	4.4.37	37,620	+ 12,738	14	406,779	384,159	+ 22,620	Ord. Stk.	86	46½	96½	2 16
	Taltal	164	Mar., 1937	3,880	— 385	39	31,810	32,750	— 940	Ord. Sh.	115/32	14/–	11/8	8 8
	United of Havana	1,353	10.4.37	48,603	+ 21,106	41	1,079,818	945,879	+ 133,939	Ord. Stk.	3¼	1	4	Nil
	Uruguay Northern	73	Feb., 1937	865	+ 61	36	8,461	6,528	+ 1,933	Deb. Stk.	5	3	9	Nil
Canada.	Canadian National	23,566	7.4.37	792,488	+ 120,701	14	9,787,926	8,727,742	+ 1,060,184	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	—4 p.c.	Perp. Dbs.	76	51	70	5 11/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104¾	99¾	98½	4 1/16
	Canadian Pacific	17,223	7.4.37	513,800	+ 40,800	14	6,877,200	6,359,800	+ 517,400	Ord. Stk.	16¾	10 15/16	14½	Nil
India.†	Assam Bengal	1,329	20.3.37	39,967	+ 4,746	48	1,314,048	1,234,207	+ 79,841	Ord. Stk.	87¾	82¼	74½	4
	Barsi Light	202	20.3.37	2,932	— 1,335	48	111,292	139,777	— 28,485	Ord. Sh.	77½	65½	59	8 7/16
	Bengal & North Western	2,107	20.3.37	89,988	— 6,124	22	1,410,768	1 345,585	+ 65,183	Ord. Stk.	319	292 5/8	308	5 15/16
	Bengal Dooars & Extension	161	31.3.37	2,901	— 315	52	129,497	139,016	— 9,519	,,	127½	118	104½	5¼
	Bengal-Nagpur	3,268	20.3.37	220,800	+ 43,111	48	6,014,876	6,277,750	— 262,874	,,	104	100¼	92½	4 5/16
	Bombay, Baroda & Cl. India	3,072	31.3.37	296,325	— 9,300	49	8,947,050	8,430,150	+ 516,900	,,	114	110½	111½	5 8
	Madras & Southern Mahratta	3,229	20.3.37	169,575	+ 3,815	48	5,411,958	5,247,600	+ 164,358	,,	116½	108½	105½	7 9/16
	Rohilkund & Kumaon	572	20.3.37	18,942	— 2,284	22	275,425	271,248	+ 4,177	,,	311	286	310	5 15/16
	South Indian	2,532	20.3.37	114,759	+ 4,053	48	3,890,438	3,810,579	+ 79,859	,,	107½	102 5/16	101½	5 7/16
Various	Beira-Umtali	204	Jan., 1937	62,738	+ 1,539	17	268,806	254,392	+ 14,414	—	—	—	—	—
	Bilbao River & Cantabrian	15	Feb., 1937	1,646	— 506	9	2,682	3,470	— 788	—	—	—	—	—
	Egyptian Delta	620	31.3.37	6,627	+ 181	52	254,529	250,757	+ 3,772	Prf. Sh.	2¼	1 5/8	1 5/8	Nil
	Great Southern of Spain	—	—	—	—	—	—	—	—	Inc. Deb.	1½	1/3	3½	Nil
	Kenya & Uganda	1,625	Feb., 1937	274,358	+ 24,224	9	563,494	483,510	+ 79,984	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	50½	37	46	7 5/8
	Mashonaland	913	Jan., 1937	116,140	+ 18,269	17	489,820	410,904	+ 78,916	—	—	—	—	—
	Midland of W. Australia	277	Feb., 1937	11,323	— 2,175	35	106,190	111,949	— 5,759	Inc. Deb.	97	93½	96	4 1/8
	Nigerian	1,905	20.2.37	72,932	+ 18,828	47	2,259,455	1,735,308	+ 524,147	—	—	—	—	—
	Rhodesia	1,538	Jan., 1937	210,786	+ 30,327	17	875,434	756,444	+ 118,990	4 p.c. Db.	107	103½	109	3 11/16
	South Africa	13,263	20.3.37	605,376	+ 29,318	51	31,069,118	29,149,569	+ 1,919,549	—	—	—	—	—
	Victoria	4,728	Nov., 1936	868,988	+ 45,953	21	3,995,540	3,959,297	+ 36,243	—	—	—	—	—
	Zafra & Huelva	112	Feb., 1937	13,311	+ 2,570	9	29,193	21,230	+ 7,963	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16.

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value.

Diesel Railway Traction

High-Power Diesel Locomotives

SOME PROGRESS is being made now in the application of very large diesel-electric locomotives to passenger and freight train working in various parts of the world. In America, the Atchison, Topeka & Santa Fé Railroad's 16-wheeled twin-unit 3,600 b.h.p. locomotive, which is used for hauling the Super-Chief train from Chicago to Los Angeles, hitherto has been the only U.S.A. diesel locomotive in excess of 2,000 b.h.p., but the A.T.S.F. has just ordered another locomotive of similar power though lighter weight and with a streamlined contour. It is to be used on the Super-Chief service at the head of the train of stainless steel coaches now under construction by the E. G. Budd Manufacturing Company, and the present locomotive and train will be transferred to other services. The Baltimore & Ohio Railroad also has ordered two twin-unit streamlined trains of 3,600 horsepower, and will put them to use on New-York—Washington—Chicago expresses such as the Capitol Limited. In France, the two 4,000 b.h.p. twin-unit 4-6-4 + 4-6-4 diesel electric locomotives ordered two years ago by the P.L.M. Railway for the Paris-Riviera service, are approaching completion, and probably will run trials before the end of the year. The end of the year also is scheduled as the time for the completion of the Sulzer-engined 4,000 b.h.p. oil-electric locomotive for passenger and freight service over the heavily-graded Campina-Brassov line, the diesel locomotive in this instance having been decided upon as a cheaper alternative to electrification. Finally, the Norwegian State Railways are to put into service on the Oslo—Bergen line a diesel-electric locomotive with a continuous output of at least 3,000 b.h.p. Should it prove successful it is possible that an order for three further locomotives would be placed in order to work all the principal Oslo—Bergen passenger trains by diesel. All the American examples are powered by two-stroke engines and all the European locomotives have supercharged four-stroke engines.

Railcars in the Levant

WITHOUT data as to actual operating conditions it is unwise to form any strong opinion upon the mileages or operating costs of railway tractors, for, to take an example, a relatively small annual mileage does not necessarily mean that the vehicle can do more. It may possibly be doing all that is required of it. Operating conditions of a nature not often met with in European countries are to be found, for instance, on the Damas Hamah Railway in Syria, and the account of the railcar service on that line, which is given elsewhere in this issue by the responsible engineer, should repay careful attention, as it gives an idea of how diesel vehicles may pay despite a scanty service and a comparatively large number of vehicles for the aggregate train mileage. In the first place, of course, the labour in Syria is not highly-skilled and the plant is not replete with machine tools of the latest patterns. Any possibility of operating the services with three cars therefore had to be abandoned, and four vehicles were purchased. Normally, two operate the service, one is held as spare, and the other is considered as being in the shops, although it is by no means always that the fourth car actually *is* under repair. Despite the low ratio of the time in service to the time available, the first of the cars has averaged 58,000 miles a year for two years, and this over a line having difficult characteristics, such as the long rise out of the Mediterranean port of Tripoli, a dusty atmosphere, intense heat in summer, and a high altitude on the inland portion. The higher speed at which these railcars are permitted to run over indifferent track compared with the steam locomotives has resulted in the end-to-end time being cut by 45 per cent., a saving worth a good deal in bodily comfort in a country such as Syria, and one of which travellers have shown their appreciation. The ingenious manner in which engine cooling problems have been surmounted is worth emphasis, for the methods adopted are not only simple, but bring in their train a number of " extras " which assist in the smooth operation of the car and eliminate some of the causes of occasional breakdowns. They are, of course, peculiar to tropical and sub-tropical lands, for the problem in the latitude of England is usually one of over-cooling rather than under-cooling.

More L.M.S.R. Diesels

SPEAKING at a meeting of the Diesel Engine Users' Association on Wednesday night, Mr. E. J. H. Lemon, Vice-President of the London, Midland & Scottish Railway, said that his company had just ordered 20 diesel shunting locomotives. Although this news was not unexpected, it is a decided confirmation of the opinion that responsible British railway officers are not slow in realising the merits of oil-engine power for shunting, and it may be taken that this latest order is backed up by the favourable experience obtained with the units—diesel-electric and diesel-mechanical—which are already in service. Moreover, Mr. Lemon considered that use could be found for 100 diesel shunters on the L.M.S.R., and as including the present order the L.M.S.R. total will reach 50, there are still another 50 to come within the bounds of probability—a distinctly cheering sign when it is realised that this represents the view of only one of the four big companies, and that the other three may be favourably disposed towards the adoption of railcars or locomotives. Mr. Lemon made it clear that any troubles which had been experienced with the L.M.S.R. diesels had been not so much with the engine as with other constituents. He did not enthuse over the lightest types of railcars—apparently despite the success of the four-wheeled Leyland cars on the L.M.S.R.—but there still remain many types of duties in this country for which oil-engine traction could put up a copper-bottomed watertight case, and these duties range from long-distance high-speed trains to ordinary branch line services.

FEATURES OF THE HUNDRED RAILCARS FOR ARGENTINA

Standardised construction applied to five different types of seating and luggage accommodation

THE 99 diesel-mechanical railcars recently ordered from the Drewry Car Co. Ltd. of 13, South Place, London, E.C.2, are of metal construction, with the body framing formed integrally with the underframe, and the whole body and frame is being assembled largely by welding. The same type of construction is being used also for the eight Drewry cars being built for the Entre Rios and Argentine North Eastern Railways.

Intended for a variety of services on the broad gauge lines of the Buenos Ayres Great Southern and Buenos Ayres Western Railways, the 99 cars of the first order have five different interior arrangements, four of which are shown by the accompanying diagrams. The fifth is a buffet car, with a kitchen, a small amount of luggage space, a lavatory, and about 28 first class seats with tables between. All these types have standard bogies, underframing, body details, body framing sections, and power and transmission equipment, and they represent the first large-scale attempt by a British firm to take the fullest advantage of standardisation while retaining the necessary flexibility of interior arrangement. Other features common to all the cars are double-end drive, rounded contour of the body ends, and light cattle guards of welded steel plates and sections.

All cars are of the double-bogie type with one power and one trailing bogie. The engine and transmission are carried on the former, only one axle of which is driven. With the top engine speed of 1,700 r.p.m. the four steps of the gearbox give track speeds of 11½, 20, 30½, and 47½ m.p.h. The average laden weight of the cars is about 21 tons. Light type side buffers and central drawgear is fitted to enable cars to be coupled to form up to three coach trains.

Body and Framing

The main underframe is constructed from light rolled steel sections with channel section side and end members, well braced by transverse channel and plate members and reinforced where necessary by means of angle sections, knees, and gusset plates. The body framing is made up principally in 16 s.w.g. pressed steel sections attached to the solebars through gussets at the base of the pillars, together with cross bars or stretchers, the whole forming a hoop structure combining lightness with maximum strength. The longitudinal members are securely attached to the pillars and welded in position, the whole being suitably braced and reinforced by gusset plates to preserve rigidity and prevent distortion due to acceleration and braking stresses.

Planished steel sheets of 18 s.w.g. have been used for the outside panelling, which as far as possible are flush-sided with a minimum of mouldings. All the steel used in the construction of the body is of first quality c.r.c.a. suitable for oxy-acetylene or electric arc welding, and guaranteed to conform to the following specification:

Yield point	25/28 tons sq. in.
Ultimate yield	28/32 do.
Elongation	10 per cent. in 2 in.

All framing prior to assembling and panelling was thoroughly coated with Bitumastic compound to prevent corrosion.

Pressed steel members and sheet steel panels form the roof, and the rounded ends are formed from beaten metal panels. The ceiling inside is lined with plywood in the passenger compartments, and enamelled white or in a soft green shade. The necessary degree of insulation has been afforded by the space between the outside panelling and inside finish, and the pillars and other framing members are drilled at intervals to ensure free circulation of air and so prevent sweating and corrosion.

Tongued and grooved red deal boards are used for the floor, and the necessary trap doors and openings are provided to afford access to bogie centres, brake gear, and transmission units. All such openings are properly fitted and edged with metallic beading. The floors for the passenger compartments are covered with Spencer-Moulton rubber carpet, and the sides of the floors are coved and rounded to facilitate washing out, drain plugs being provided where required. Luggage compartment floors are covered with hardwood wearing slats. The driver's compartment windows are arranged to open and are fitted with armour-plate glass. A full-drop window is situated next to the driver, and the front windows are of the fixed type. The side openings in the passenger compartments are fitted generally with half drop lights.

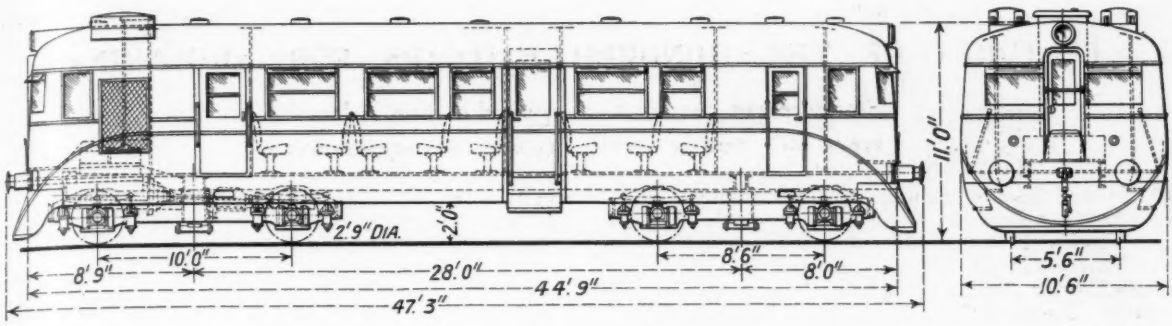
Entrance and exit doors of the passenger saloons are arranged as shown on the appropriate plans. All doors are of the hinged type and open inwards. The hinged internal communicating doors to the drivers' compartments are fitted with private locks. Passengers' entrances are provided with steps to enable access to be gained from both rail and platform levels.

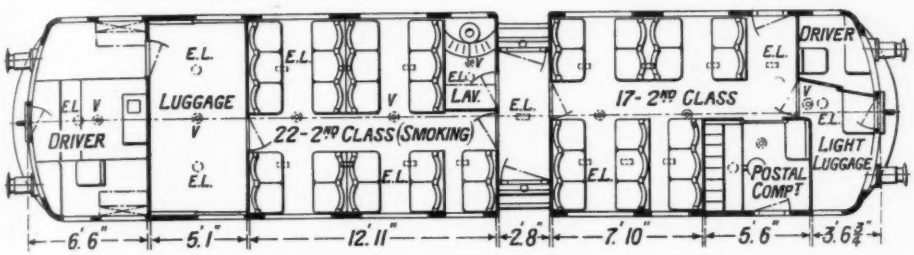
Each driver's window is fitted with a steel sun visor and an automatic screen wiper. All lighting fixtures and fittings are of J. Stone & Co.'s railbus type to suit the class of vehicle, and passenger entrances are provided with lights to facilitate entry at night. Overhead luggage racks are provided in addition to the luggage space formed beneath the seats. The seats themselves are mainly of the double back-to-back type, although many are installed as single units; they are upholstered to suit the requirements of the various car layouts. In addition to the ventilation afforded by the side openings, the main roof is provided with a suitable number of Monarch extractor ventilators.

The heating system on these railcars comprises a Cochran Sinuflo exhaust gas hot-water boiler mounted vertically in the casing above the engine and located side by side with the silencer. The exhaust gases are brought through a flexible connection to a Y-type hand-controlled by-pass valve with exits to the silencer and boiler. The output of the boiler is controlled by passing more or less of the exhaust through it. This arrangement also permits of the heat being shut off in summer without the necessity of emptying the water from the system.

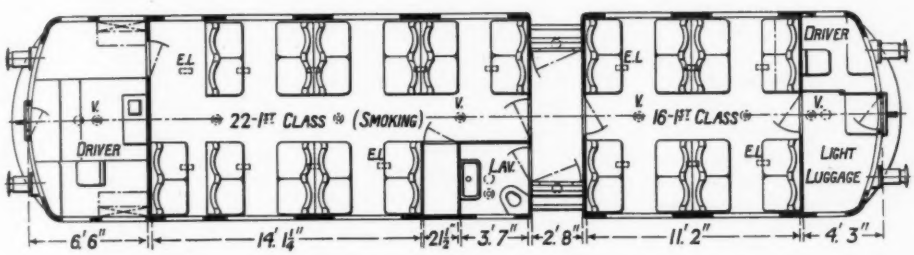
Bogies

All the bogies, whether of the power or trailing type, are of the swing-bolster type, and are fitted with tyred disc wheels of 2 ft. 9 in. diameter on tread. The power bogies are constructed of rolled steel plate side members, with channel-section end and cross members, the side plates being reinforced as required by angle sections. The whole structure is well stayed by transverse bracing members and reinforced as required by angles and gussets, accurately aligned and riveted or welded, a combination of both methods being used in assembly. The trailing

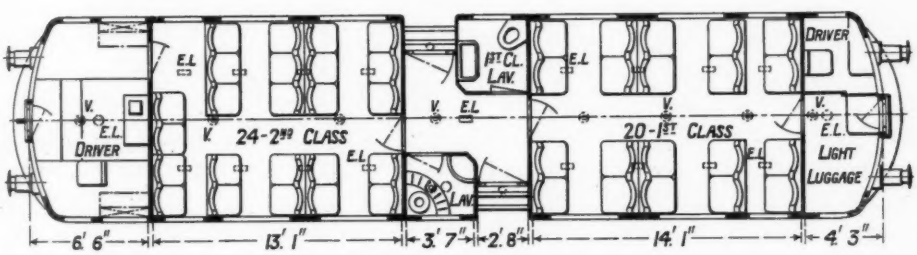




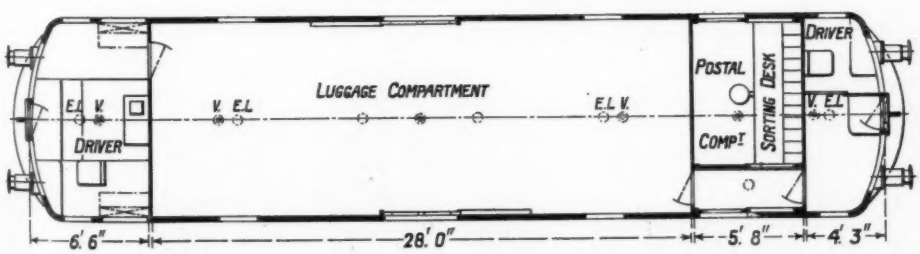
Railcar of type A. **38** *of these vehicles are being built*



Railcar of type B. **30** *of these vehicles are on order, and also two buffet cars classed as* **B 1**



Railcar of type C. **14** *of these first and second class composite vehicles are being built*

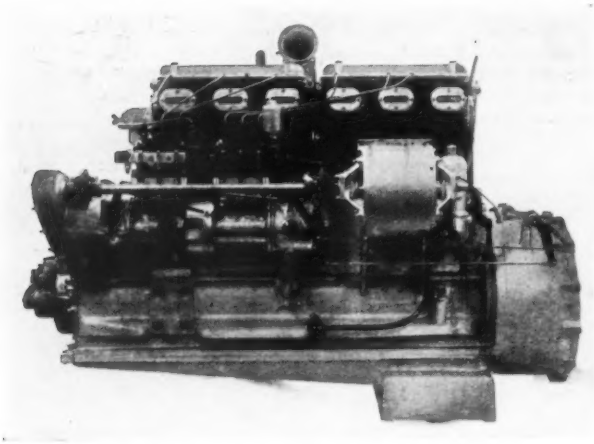


The order of **99** *cars is completed by* **15** *of these luggage and light goods cars, which are styled type* **D**

bogies are of the plate-framed type of similar though lighter construction than that of the power bogie, but the wheels, axleboxes, and other details are interchangeable between the two types.

Cast-steel centre pivots and side rubbing-blocks are fitted, and adequate provision has been made for their lubrication, together with all necessary check springs, &c., all of which are interchangeable between all bogies. Cast-steel axleboxes fitted with Timken taper roller bearings are used throughout the order, a total of 796 bearings being required for the 99 cars and one spare power bogie. The axlebox guides are of cast steel with manganese steel liners. Laminated springs are being used for the axle bearings, and have adjustable hangers fitted with auxiliary helical springs. Helical springs are used also for the swing bolsters of both power and trailing bogies.

Straight vacuum brakes with equipment of Westinghouse manufacture are fitted in addition to a hand screw brake operated from each driving compartment. The vacuum cylinder is located beneath the underfame and



102-b.h.p. Gardner engine of the type used in the Drewry cars

through brake rigging of the usual type applies one cast iron block on each wheel. Westinghouse equipment also extends to a double-cylinder brake exhauster driven from the engine, and an E 13 type compressor which furnishes the air for the control of the transmission.

Engine and Transmission

The engine used in all cars is of the Gardner 6 LW type, as described in detail in the issue of this Supplement for March 19. The six cylinders have a bore and stroke of 4·25 in. by 6·0 in. and develop a maximum output of 102 b.h.p. at 1,700 r.p.m. Oil cooling is effected by an independent radiator mounted on the bogie frame.

A large capacity vertical gilled-tube radiator made by Spiral Tube & Components Co. Ltd. is mounted on each side of the coach body adjacent to the power bogie. Cooling is assisted by an engine-driven centrifugal circulating pump, and special types of Monarch air extractors are provided in the coach roof which, in conjunction with sheet metal ducts formed in the coach body, ensure that the requisite amount of air passes through the radiator tube blocks when the car is running or stationary. The Gardner engines are fitted with a thermostat to control the water temperature.

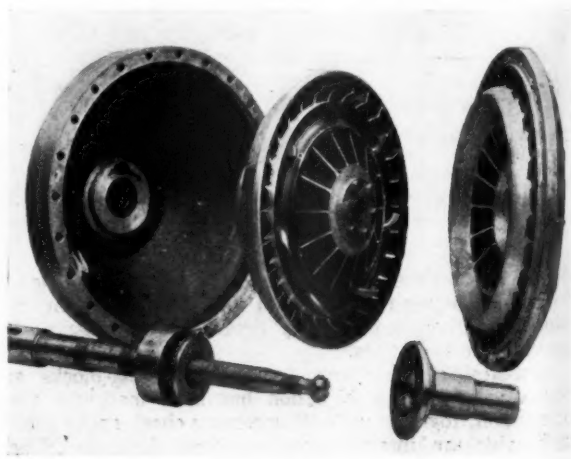
Main fuel tanks are housed on the main underframe and carry sufficient fuel for a normal radius of 400 miles. Fuel feed to the engine is by means of Autovac vacuum tanks. The main fuel tanks are of welded construction and are provided with large filling orifices, a dial-type depth gauge, and suitable internal baffles to prevent fuel surging. Fuel strainers are provided in the main fuel line and on the engine. An efficient silencer is fitted, and the tail pipe is led away to roof level through an uptake formed in the body of the coach.

A Vulcan-Sinclair traction-type fluid coupling is incorporated in the engine flywheel, and constructionally it conforms to the Hydraulic Coupling & Engineering Co. Ltd.'s standard practice with impeller, runner, and casing all of high-tensile aluminium alloy. The coupling is designed to transmit 102 b.h.p. at 1,700 r.p.m., with a slip of about 3½ per cent. when filled with thin lubricating oil. Starting slip is taken up by the fluid coupling, thus relieving the epicyclic gearbox brake bands of wear from this source. The fluid coupling also renders it impossible for the driver to stall his engine as a result of overloading.

A four-speed preselective Wilson-Drewry epicyclic gearbox forms the main constituent of the transmission. Ball and roller bearings are used throughout the running gear of the box, and lubrication is under pressure from a positive plunger pump contained in the box itself. The epicyclic brake bands are self-centring and completely encircle the drums. They work in oil, and adjustment of the bands for wear is automatically compensated within the box by means of coil spring ratchet adjusters. The gearbox is provided with pneumatic control for gear selection and gear engagement. The air is utilised only for effecting changes of speed, and the box does not depend upon air pressure for the retaining of the brake bands in engagement, this being obtained by means of a powerful coil spring.

Gear selection is effected by means of small air cylinders embodied in the gearbox side cover, which control the struts, and gear engagement is effected by an air cylinder which operates the gearbox bus-bar. The selector and engagement cylinders are controlled by means of electro-pneumatic valves situated adjacent to the cylinders, the air connections being thus short in length, resulting in absence of time-lag, the control connections to the two control desks being simple electrical circuits. The air cylinder controlling the gear engagement is provided with a choke which restricts the exhausting air and so controls the rate of engagement by a pre-determined amount. Harsh manipulation of the control thus cannot result in damage to the gears.

The reverse gear is mounted on the driving axle. Resilient couplings are fitted between change-speed and reverse gearbox, and positive alignment between these two components is assured by the method of mounting in the sub-frame. A short universally-jointed cardan shaft conveys the drive from the engine to the change-speed box. The reverse box itself is a steel casting with light alloy top and bottom covers. The gears are of special case-hardened nickel-alloy steel mounted on nickel steel shafts running in ball or roller bearings. The reverse gears consist of a spiral-bevel pinion in mesh with two crown wheels of similar type, the latter running loose on the reverse shaft and being provided with internally-cut teeth. A reverse dog mounted on the splined centre portion of the reverse shaft engages with one or other of the two crown wheels as required, the actuation being by means of Westinghouse standard diaphragm-type air cylinders mounted externally on the box. A locking device is incorporated in the reverse handle to enable the latter to be positively located in the neutral or mid position should it be required to tow the coach. The reverse control is electro-pneumatically operated, and the reverse lever is embodied in the change-speed control quadrant. A simple form of interlock on the latter renders it im



Components of Vulcan-Sinclair fluid coupling

possible to actuate the forward-and-reverse control until the change-speed is in the neutral position. The final reduction gear to the axle is contained in the reverse and final drive casing and is of the helical-tooth spur wheel and pinion type, the standard overall ratio being 3·44 : 1 and giving a car speed of 47·5 m.p.h. at the governed maximum of the engine (1,700 r.p.m.).

The engine is started by means of a 24-volt C.A.V.-Bosch axial pattern electric starting motor engaging with a toothed ring on the flywheel in the normal manner. The Gardner engine can be started from cold, either by hand or electrically, in a few moments without the use of heater plugs, intensifiers, or other external adjuncts. Hand turning gear is provided on the bogie, and a starter push is mounted on each of the two control desks. A feature of the installation is the way in which the engine and the

Brake band assembly and side cover for air selection of Wilson-Drewry four-speed gear box

components of the transmission are mounted in the driving bogie. The engine and Vulcan-Sinclair fluid coupling are carried through balata pads on two longitudinal members running from the outer headstock to the centre transom. The Wilson-Drewry gearbox, flexible coupling and reverse box are located on a separate three-point suspension subframe behind the bogie pivot, which is anchored at the front end to the centre transom through a spring mounting and which terminates at the rear end in the axle-mounted reverse and final drive unit.

Electrical Equipment and Controls

The engine drives a Stone's miniature Tonum dynamo of the 24-volt 1,200-watt type, and a lead-acid Stone's battery is situated beneath the main underframe. The battery has a capacity sufficient for one hour's stand-by lighting in addition to normal starting and lighting services.

A Stone's swivelling-type head lamp is mounted at each end of the coach, together with all necessary marker-lamps. Internal coach lighting is provided by a number of domed roof lights, these being grouped for partial illumination. All cables are carried in metal conduits or flexible metallic casings, and protected by suitable fuses. The main switch is situated in the driver's compartment at one end, and at one of the two driving positions there is a dynamo.

The controls are grouped on a control panel in front of each driving position, and each set of controls comprises an engine speed governor control; combined single-lever control for gear selection and gear engagement; forward and reverse control, all controls being operated electro-pneumatically; driver's brake valve; hand screw brake. In addition to these there are the usual controls for the auxiliaries such as starter motor, etc., situated in accessible positions on or adjacent to the control desks. Each driving position is furnished with a full set of instruments including speedometer, oil-pressure gauge, indicating light, duplex gauge, single air gauge for control services, and revolution counters.

All wiring conduits, pipework for braking and control services, and water circulation are painted in distinguishing colours to facilitate identification for maintenance. Control pipework where of small diameter is carried out in copper tubing to minimise scaling and facilitate reassembly after maintenance.

The contracts in question are being carried out under the supervision of the railway company's consulting engineers, Messrs. Livesey and Henderson, and the railcars are being built throughout in the Preston Works of the English Electric Co. with whom the Drewry Car Co. has been closely associated since 1930.

FRENCH COLONIAL DIESELS.—Ten diesel railcars of rather small seating capacity are to be acquired for operation on the Dakar-St. Louis and Dakar-Kaolack lines in French West Africa. Five of the cars are to have mechanical transmission and five electric.

IRISH DIESEL REBUILDS.—The three pneumatic-tyred petrol-engined railbuses belonging to the Great Northern Railway of Ireland are being fitted with Gardner 4LW high-speed diesel engines developing a maximum of 68 b.h.p. These vehicles are of the ordinary road bus type modified to suit them for operation on steel rails. They have a maximum tare weight of 6 tons and run up to 45 m.p.h.

INTERNATIONAL DIESEL SERVICE.—The triple-car diesel electric train service with French Nord stock, which it was proposed to start in February between Paris and Brussels on one hand and Paris and Liége on the other, has been postponed and the inauguration will take place on May 22. The schedules will be 3 hr. for the 194 miles from Paris to Brussels, including three stops, and 4 hr. for the 227 miles from Paris to Liége, also including three stops.

FRANCO-SWISS RAILCAR EXCURSION.—An unusual Easter excursion organised by the Paris section of the French Alpine Club gives a remarkable idea of the possibilities of long-distance and international trips by railcars. The members of the Alpine Club left Paris-Est in a Michelin railcar on Good Friday at 7.35 p.m. (WET) and arrived at Interlaken-Ost at 4.38 a.m. (CET) on Saturday, transferring there to the local mountain railways and reaching Jungfraujoch at 7.45 a.m. Three full days were available for ski-ing excursions from Jungfraujoch, ending up with a descent to Goppenstein, at the southern portal of the Loetschberg tunnel, where the railcar awaited the party, on Easter Monday. Leaving Goppenstein at 9.30 p.m. (CET) and proceeding via Berne and Delle, the railcar reached Paris-Est at 5.56 a.m. (WET) on the Tuesday morning. The overall times were therefore 8 hr. 3 min. on the outward journey and 9 hr. 26 min. returning.

MORE 3,600 B.H.P. OIL-ELECTRIC LOCOMOTIVES

American design for New York to Chicago passenger service

THE Baltimore & Ohio Railroad, which already operates on one of its subsidiary lines a 1,800 b.h.p. square-ended diesel-electric locomotive (see issue of this Supplement for July 10, 1936), has ordered two twin-unit streamlined locomotives of 3,600 b.h.p. from the Electro-Motive Company, as briefly recorded in the issue of this Supplement for January 22, and it is expected that these machines will make through runs between New York and Chicago via Washington hauling heavy passenger trains such as the Capitol Limited. The B. & O. has running powers over the Pennsylvania line between New York and Washington.

Each locomotive will consist of two half units, each carried on two six-wheel bogies and each housing two 900 b.h.p. engines. The two units may be separated when required (*e.g.*, for turning), but only the front unit will be capable of use as a separate 1,800 b.h.p. locomotive for it contains all the controls, except one low-speed control system on the second unit for use during separated shunting movements. The controls lead from the driver's cab through low-voltage battery current to relay contactors in the main control panel. These main contactors are operated through electro-pneumatic switches controlled by the driver and which vary the speed of the engine and also place the traction motors either in series or parallel grouping, the last step being arranged to shunt a portion of the traction motor fields in order to increase the speed of the motors. There are eight running positions for the main engine beside the stop and idle position. All of these positions are available for either forward or backward motion.

Power Equipment

Aft of the driving control room is the engine room, occupying the entire space between truck centres. The main engines, which are mounted directly on the underframe, comprise two Winton, 12-cylinder, vee two-stroke engines, each of which is rated at 900 b.h.p. at 750 r.p.m. The 8-in. by 10-in. cylinders are provided with removable liners and have separate cylinder heads and inspection plates, so that any one may be worked on separately without interfering with the others.

Each engine cooling system consists of a series of fin-tube radiators, a water circulating pump, and air circulating fans for radiator cooling. The cooling radiators are arranged in two long sections of coupled units hung parallel to the engines and supported by the underside of the roof. The water supply is taken from tanks located under the frame, which permits self-draining of the radiators during cold weather. Air is drawn into the engine room compartment through grilled openings and forced by means of large engine-driven fans through the radiators. After passing through the radiators, the air leaves through a series of vents into an exhaust manifold in the roof.

For convenience in application two 330-gal. fuel oil tanks are place beneath the underframe. The tanks are directly connected together. The water tanks have a capacity of approximately 1,040 gal.; they are located beneath the underframe and in addition to furnishing water for the engine cooling systems, also furnish the water for the heating boiler.

Each 900 b.h.p. Winton engine drives a 700 kW. d.c. main generator through a flexible coupling. The generator voltage varies from 250 to a maximum of 750, and the field excitation is from a separate auxiliary generator mounted on the same shaft as the main generator. The field of the auxiliary generator is excited by the battery at 64 volts and the output of the main generator is varied by the variations made in the voltage output of the auxiliary generator. The main oil engines are started by applying, through switch buttons on the main control station, battery current to a special series starting winding in the field of the main generator. There is also a supplementary starting station located inside the engine room adjacent to the engine. An auxiliary diesel power plant is used to furnish current for the various auxiliaries, as well as for charging the storage batteries. The four batteries are of the Exide 32-cell 450 amp. hr. type; they supply electric current for engine starting, control operation and all auxiliaries such as the fuel pumps, motors for heating boiler, and locomotive lights.

Behind the engine room the remainder of the cab is occupied by a Clarkson forced-circulation water-tube spiral-coil heating boiler and its extraneous equipment. This boiler contains six coils which rise spirally, the diameter of each spiral being less than the other so that a nest is formed in the centre where combustion occurs. The water and steam are forced from the coils into a steam separator which is a unit outside of the boiler itself. This boiler is oil fired and is designed for a safe working pressure of 255 lb. per sq. in. However, it will only be operated at a pressure not exceeding 125 lb., the average train line pressure.

The second half unit of each locomotive has the same internal arrangement as the first with the exception that the space occupied by the driving control room on the first section is used on the second unit for a toilet and wash room for the crew. The trucks will be of the six-wheel type, equipped with roller bearings, and each truck will carry two traction motors, each of which will be geared to a pair of wheels and supported by a spring nose suspension.

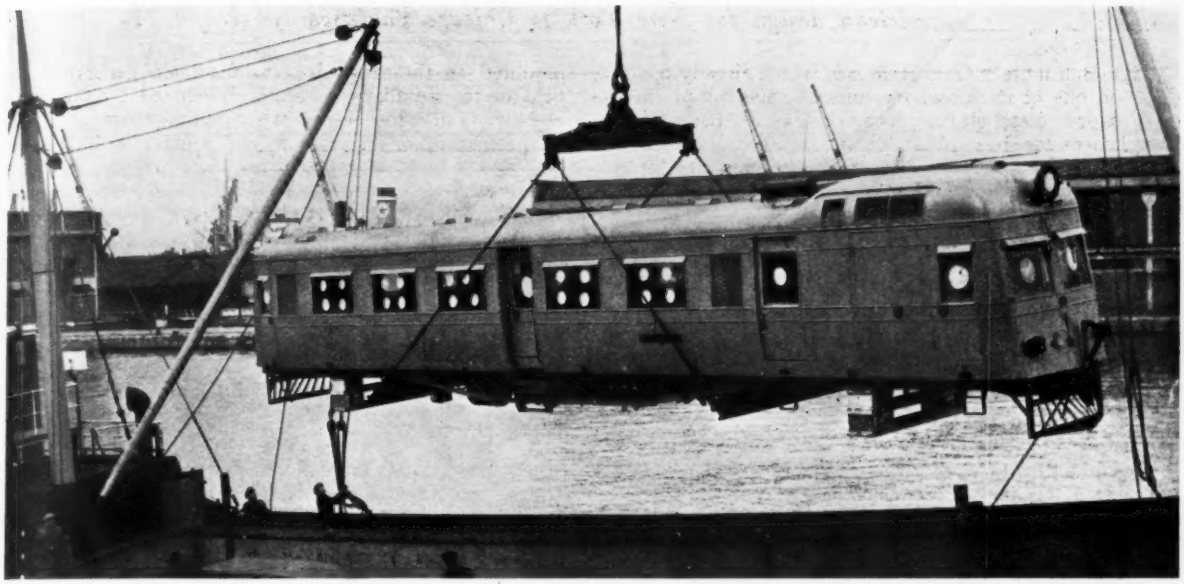
Braking apparatus will be of the New York Air Brake Company's type, and the locomotives will have the General Railway Signal Company's train control, the application being very similar to that followed on steam locomotives operating on the Baltimore division. The estimated weight of each half unit is 270,000 lb. (120 English tons), or 540,000 lb. (240 tons) per locomotive. The adhesion weight will be about 360,000 lb. (160 tons), and the tractive effort 90,000 lb. at starting and 19,200 lb. at 60 m.p.h.

GARDNER ENGINES.—In the description of the Gardner engines for rail traction published on pp. 562–564 of the issue of this Supplement for March 19, we mentioned that one of the two types used was the L2. Actually this should have read the L3 type, which is a modification of the L2 design with cylinders having a bore and stroke of $5\frac{1}{2}$ in. and $7\frac{3}{4}$ in., respectively.

ANOTHER AMERICAN GIANT.—The Atchison Topeka & Santa Fé Railroad has ordered another double-unit 3,600-b.h.p. diesel-electric locomotive, this time with a streamlined body. It will be used for hauling the Super-Chief express between Chicago and Los Angeles, hauling the new light-weight train now approaching completion. The present Winton-engined square-ended locomotive will be transferred to other duties.

DIESEL-ELECTRIC RAILCARS FOR AUSTRALIA

140 *b.h.p. vehicles for trailer haulage up to* 40 *m.p.h.*



Shipping the body of one of the Armstrong-Whitworth 3 ft. 6 in. gauge railcars

JUST over a year ago, Sir W. G. Armstrong-Whitworth & Co. (Engineers) Ltd., received an order from the Western Australian Government Railways for the chassis and power equipments for six railcars, and a complete body for one of them; in addition, five sets of metallic fittings, body framing windows, seats and insulation were ordered for installation in the remaining bodies, which were to be built in Australia. These six railcars have now been shipped, and a spare engine-generator set has been sent out. The cars were built to the requirements of Mr. J. W. R. Broadfoot, the Chief Mechanical Engineer of the Western Australian Government Railways, and the single body shipped from England was built by Park Royal Coachworks Limited.

Designed for operation on 3 ft. 6 in. gauge lines, the cars seat 40 passengers, and have a small amount of luggage space in addition to two lavatories. There is a driving compartment at each end, and trailer haulage is possible. Standard centre couplers are fitted. Special trailers of light construction are being built in Australia.

Bodywork

The body framing consists of special patented metal sections, electrically welded where possible, but riveted wherever there is the possibility of replacement or repairs being necessary. The floor bearers consist of two channels fitted back to back and electrically welded together. They are secured to the pillars with gusset plates. The whole framing is treated with non-corrosive paint to prevent rust.

The roof is supported on mild steel angles which are laid in pairs on steel distance pieces, allowing an air space throughout the roof between inner and outer linings. The exterior panelling is steel lined on the inner side with asbestos sheet, and the interior panels are of plywood. The partition between the driver's compartment and the engine room is insulated with Insulwood, and panelled with Plymax. Closely-fitting gas-tight doors are formed in this partition to give increased access to the power equipment. The floors are covered with Insulwood, on which the linoleum is laid. Radiused panels are employed at the sides, the linoleum being carried right up to the seat rails, thus avoiding a dust trap and at the same time providing a kicking panel along the whole length of the coach. Double-faced Rexine spring roller blinds are fitted to all the windows in the passenger compartments, and the interior decoration is carried out in Rexine with a fade-out pattern with polished mahogany finishers and rails.

Semi-flush lighting fittings are arranged under the parcel racks, and in the vestibule over the engine steps. Similar fittings are employed in the lavatories, but ordinary bulkhead type fittings are used in the drivers' and luggage compartments. The windows in the passenger saloon are of the Beclawat half-drop type, and those in the drivers compartment and in the luggage compartment are of the full drop pattern. The seats are arranged back to back, and upholstered in first quality Rexine with spring fillings both to cushions and back rests. Arm rests are fitted on the gangway side, and all fittings such as grab handles and luggage brackets are chromium plated.

Underframe and Bogies

The underframe consists of two main longitudinal members placed outside the wheels, and as is customary in Armstrong-Whitworth vehicles, these are of fabricated lattice girder type. In the design of the underframe and of the bogies consideration has been given to loading gauges other than that of the Western Australian Government Railways. Fabricated stretchers spacing the main frame members are arranged at intervals. Each of these is arranged to perform some function such as the carrying of the water tank, support for the traction motor, or mounting for the brake cylinders.

The bogies follow previous Armstrong-Whitworth designs in using box girder side frames which permit the placing of the laminated bearer springs between the sides of the box girder. The frame members of the two bogies are identical but the springing is arranged to cater for the

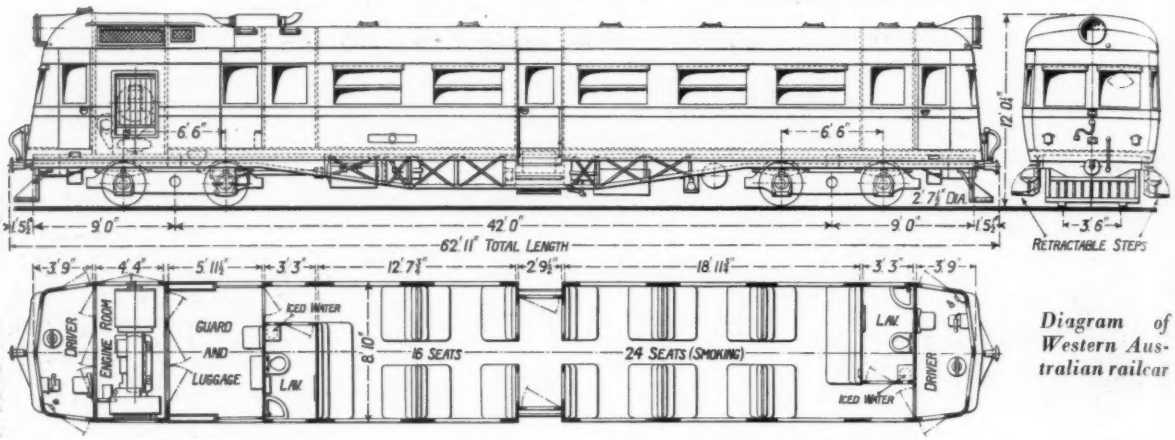


Diagram of Western Australian railcar

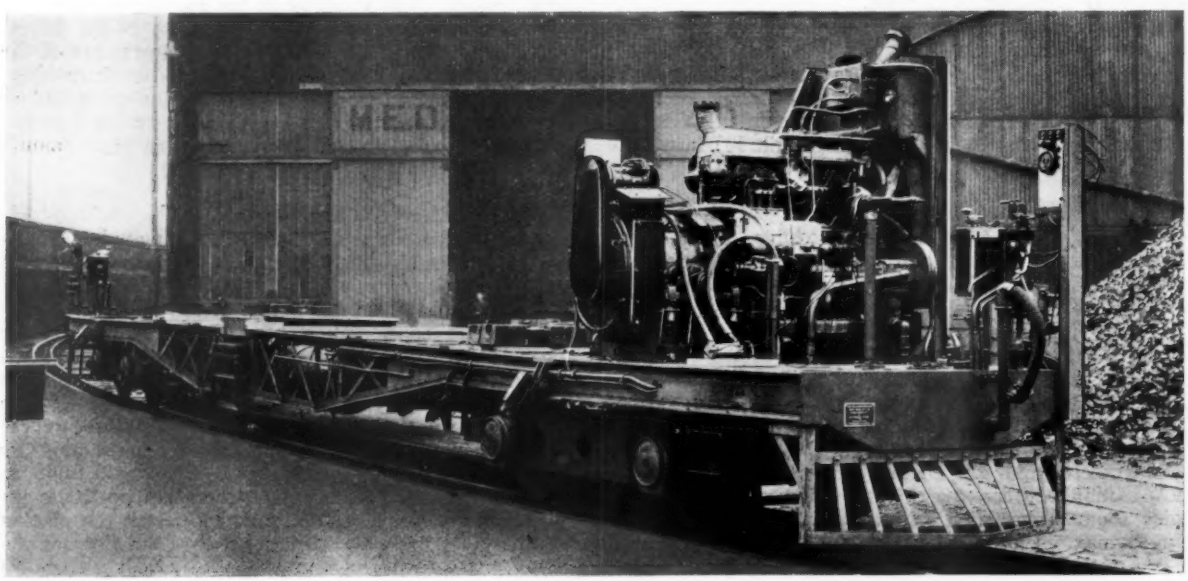
heavier weight of the engine at one end. The fabricated bogie bolsters are swung and mounted on nests of helical springs, the side bearings taking the form of spherical-headed buttons which are renewable. The bearer springs are fitted with rubber auxiliary springs housed within the lower channel of the box girder side frames; rubber stops are fitted inside the bogie side frames to limit the swing of the bolster. The bogie brake gear is of straightforward design and the elimination of complication has been assisted by the use of compression members of tubular form with eye pieces welded in. Renewable brake blocks are mounted in cast steel shoes, and a spring-loaded friction plate retains the brake blocks in alignment with the wheel and maintains the blocks clear of the wheels when the brakes are in the off position.

Grease lubrication is employed throughout the chassis and Tecalemit nipples are arranged in the most convenient positions; for example, the brake cross shafts on the main frame as well as on the bogie have their greasing points brought to the outside for ready access. Isothermos axleboxes are fitted, those at the engine end being of larger size than those on the trailing bogie. This difference in size is made up by the axlebox guides which are bolted between the plates of the box-girder side frames allowing the bogie frames to be exactly the same at both ends of the car.

Particular provision has been made in the design of these cars to render them suitable for stopping at pre-determined halts other than at stations and they have been equipped with folding footsteps (Ross system) to enable passengers, particularly children, to mount the car from ground level. These steps can be folded up or let down by the driver, the operation being through a vacuum cylinder from the brake service on the car. Neat operating valves have been incorporated in the driver's brake valves with which they are interlocked, so that the steps can be lowered only when the brake is on.

Water for passenger requirements is carried in a tank on the end frame and is delivered to the points of supply by J. Stone & Co. Ltd.'s water-raising apparatus, the compressor of which is mounted on the underframe close to the water tank while the pressure control switch and emergency press button are unobtrusively mounted in one of the lavatories.

The braking is on the vacuum system in conformity with the railway's standards. A Consolidated-Brake-Reavell type of exhauster is mounted on the power unit and driven by multiple V belts from the engine crankshaft. An



Chassis and power unit of diesel-electric railcar for Western Australia

interesting feature in connection with this direct drive is that if the main controller handle is moved backwards from the idling position, the engine can be speeded up without transmitting power for traction. In addition to enabling the engine to be warmed up quickly, this allows the driver to speed up his exhauster and obtain a quick release to the brakes prior to moving off from a station.

The Engine and its Mounting

The main structure of the Armstrong-Saurer 140 b.h.p. engine has not called for any major modification as a result of the experience gained with it in service, but small improvements have from time to time been incorporated. In these Western Australian cars the engine is directly bolted to a Laurence-Scott generator and the unit is mounted on a sub-frame. This sub-frame incorporates an aperiodic flexible mounting for the engine set and incorporates rollers on which the whole unit can be rolled out of the car sideways. The sub-frame in addition to this function provides a means for transporting the engine and also for testing it without the necessity of mounting it on a test bed. It is expected that these engine sets will be overhauled at some central workshop and sent out to the various points on which the railcars are working so that they may be changed on site without the necessity of withdrawing the vehicle from service. This policy has been carried on other railways, one case in particular being the narrow-gauge Central Provinces Railway operated by the G.I.P.R. where the location of the railcar is actually 130 miles from the nearest workshop.

The engines are of the BXD type and have six cylinders 130 mm. by 180 mm. and run normally at 1,500 r.p.m. They are equipped with a new form of governor which the manufacturers have developed from their past experience to meet the conditions of railway service. Inclusive of starting motor and lighting dynamo they weigh approximately 18 lb. per b.h.p.; the cylinder heads incorporate the dual-turbulence arrangement evolved by Saurer some time ago.

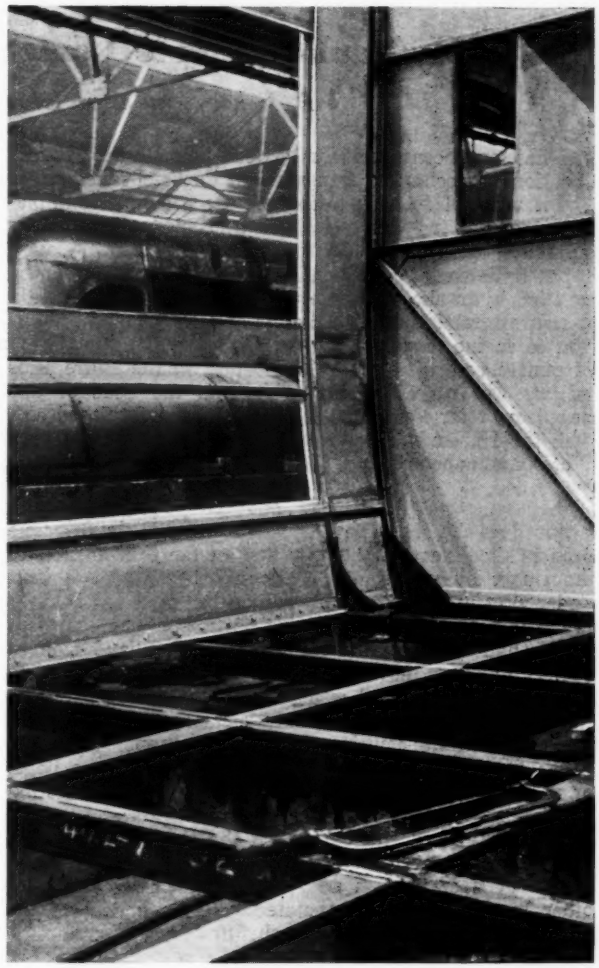
A C.A.V.-Bosch lighting and starting set is mounted on the main power equipment, the generator being driven from an extension of the main generator shaft by multiple V belts and charging a 24-volt battery located under the car. From this system current is derived for interior lighting of the coach and its trailer, and for headlights and tail lights, and also for the control solenoids and excitation of the main generator.

Transmission

The electric transmission is a simplified version of Armstrong-Whitworth's standard ABE system, which comprises a special generator directly connected to a series-wound traction motor, in this Australian example carried on the underframe and driving the inner axle of one bogie through a cardan shaft and worm. Control of power is effected through the engine throttle by means of a set of solenoids acting on a control shaft which in turn is connected to the throttle. When no tractive power is required but the engine is idling, the generator field is de-energised so that it is unnecessary to disconnect the power leads between the main generator and the traction motor. The maximum currents at starting and at top voltage (full track speed) are limited inherently by the characteristics of the generator. Between these limits the design of the generator enables the engine to be worked at full torque and at or just below full speed. The engine can neither over-run its rated speed, due to the governor, nor stall, due to the characteristics of the generator in requiring a smaller torque with any drop in engine speed.

The transmission contains no main circuit contactors and the only interruption of current which takes place is that of the separate field of the main generator when power is cut off. From the maintenance point of view, therefore, there is only one small contactor in the system. A simple electro-magnetic reverser is located under the car close to the traction motor. The torque reaction of the final worm drive from the traction motor is taken by a radial arm shackled with silentbloc bushes to the adjacent main cross member of the bogie.

The driver's controllers include a reverse control operated by the usual removable key, interlocked with which is the master controller incorporating the deadman handle. The main control handle can be moved backwards against a spring load to speed up the engine and thereby increase the exhauster speed for quick brake release. Returning through the idling position, the field circuit is completed through the field contactor on movement to the first notch, and a small tractive effort for inching is delivered at the wheels; subsequent notches bring into operation the appropriate speed solenoids on the engine control and give the driver a choice of power outputs. No control after the initial making of the field circuit is exerted on the electrical transmission, which is automatically self-regulating to changes of vehicle speed and provides thereby automatic acceleration without requiring the driver's further attention.



Detail of body framing of Armstrong-Whitworth diesel electric railcar for Western Australian Government Railways

Hydraulic Remote Control for Railcar Applications

British system used for engine-speed synchronisation

IT has long been considered a weak point in the application of mechanical transmissions to diesel railcars that it was not so easy to incorporate a simple multiple-unit control as with electric transmission. Various systems, such as the Ganz, Mylius and Brown-Boveri types, have overcome the difficulty, and a further pattern, on the hydraulic principle, has been applied recently to railway traction work, although only to the synchronisation of engine speeds as yet. This is the Exactor system of remote control, and its application to the Entre Rios railcars was noted at short length in the issue of this Supplement for February 19. It has been furnished also with the Harland & Wolff engines shipped to New South Wales, and is being used by Michelin in France.

Principles Involved

Based on the Hele-Shaw Beacham patents, the principle used in the Exactor system is that of the transmission of movement by means of a column of oil which is kept under pressure by opposing springs situated respectively in the transmitting and receiving portions. The operation of the hand-manipulated lever (to the left-hand side of Fig. 1) imparts a movement to the transmitter piston below it, which is reproduced exactly in the receiver piston (to the right-hand side). The only connection between the receiving and transmitting sections is a copper pipe, and if one or other of the constituents is mounted on a bogie or on another vehicle a flexible connection may be inserted in this pipe.

The hand lever is mounted on the shaft of the transmitter, and the corresponding shaft of the receiver is connected by a crank arm and link to the throttle valve or other mechanism to be operated. The cylinders of the transmitter and receiver are each fitted with a trunk-type piston, fluid tightness being ensured by a specially packed gland. The cylinders and connecting pipe are completely filled with a non-freezing liquid, and since both cylinders are of equal diameter, a downward movement of one piston must give rise to a similar upward movement of the other.

The pistons are connected by a rod and radial crank arm to their respective shafts, so that the longitudinal movement of the pistons is converted into a rotary movement of the shafts. The fluid in the system is kept under pressure at all times by means of opposing springs acting on the two pistons. This pressure causes a certain amount of friction in the special packings, and the apparatus is thus rendered practically self-locking.

If the pressure applied to the fluid by the springs is not to result in movement of the pistons it must be exactly balanced at all times. To ensure this, two concentric helical springs are mounted on a guide which is pivoted at its lower end and carries at its upper end a roller which is also connected to a rocking lever. A crank arm keyed on to the shaft is extended backwards to form a cam of varying radius, which works in a groove formed in the surface of the roller. This cam is so designed that the spring pressure which is applied to the piston acts through a short radius when the spring is compressed and through a longer radius when the spring is extended. Thus the variations of the spring pressure are compensated for, and the load on the pistons due to this pressure is constant.

Compensation and Safety Devices

It will be seen from Fig. 1 that the lower end of the cylinder of the transmitter communicates with a reservoir through a spring loaded valve. In normal operation this valve is closed, but when the operating lever is moved to the end of its stroke the final two degrees operates the valve mechanism and opens the valve against the action of the spring; the system is then open to the reservoir and the pressure is instantly released. Any variation in volume due to change of temperature or possible leakage is thus automatically compensated, a

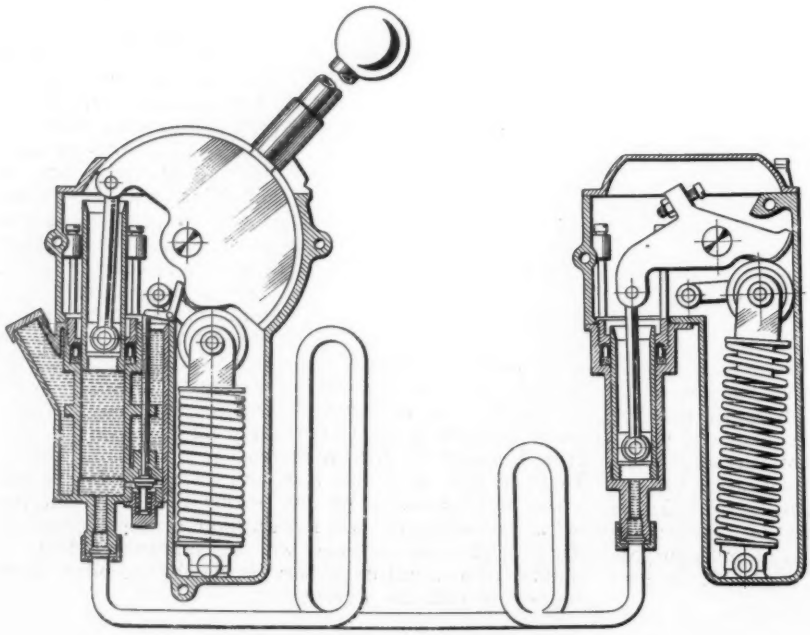


Fig. 1—Section showing arrangement of the Exactor hydraulic control as applied to the synchronisation of engine speeds. The transmitter (with operating lever) is on the left, and the receiver on the right. The shaft of the receiver is connected to the mechanism to be operated

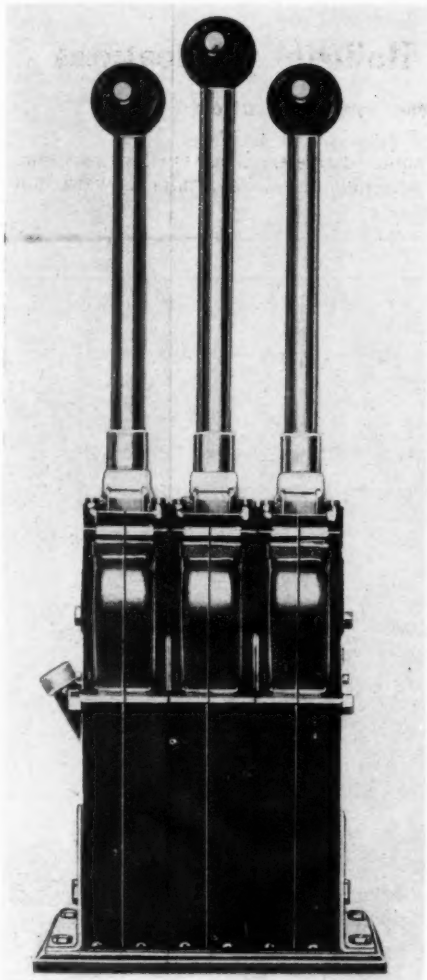


Fig. 2—Arrangement of Exactor hydraulic throttle controls for triple-engine installation

deficiency being made up from the reservoir or an excess being driven out by the receiver piston which, on release of the pressure, is forced to the bottom of its stroke under the action of its spring. The initial backward movement of two degrees of the transmitter allows the valve to close and any further movement will be exactly reproduced by an equal movement at the receiver. Similarly, the release of the pressure in the system, as a result of pipeline fracture, causes the receiver piston to be forced to the end of its stroke under the action of its spring, which ensures that any failure will result in the control moving to a pre-determined position.

The standard Exactor control as supplied to railcars is capable of transmitting a torque of 100 in. lb. through a maximum angle of 60°. The total weight of the transmitter and receiver combined is 4½ lb., to which must be added 1 lb. per 10 ft. of copper pipe. A range of Exactor controls with varying angular movements up to a maximum of 300° and capable of transmitting larger torques is available to suit special requirements. No difficulty should arise in making a flexible connection between the vehicles, either separately or incorporated in multi-purpose automatic couplers of the Scharfenberg type, and no electrical or compressed air is required.

DANISH DIESEL OPERATION

MR. P. KNUTZEN, the General Manager of the Danish State Railways, has given lectures recently in Germany and Austria, in the course of which he made some interesting remarks on the status of diesel traction in Denmark, as summarised below.

The opening of the Little Belt bridge in May, 1935, facilitated the introduction of the three-car diesel-electric *Lyntogs*, which have reduced the journey time between the capital and the two chief towns of Jutland from about 8 to 4½ hr., and as they can run direct on the ferry-boat decks, shunting is eliminated. Their maximum speeds are higher than those of the equivalent steam trains and they can maintain better up-grade averages. Denmark is not everywhere as flat as some are apt to imagine and this advantage is appreciated when running in Jutland and Fünen. Excluding off days, these trains travel 800 km. (497 miles) daily and have covered 1,250,000 km. (776,715 miles) in 18 months. They enable a better use to be made of the seating accommodation and, save at times of exceptional traffic, they attract the greater part of the passengers. The recent accelerations have enabled inland sleeping accommodation to be practically abolished, and fast morning and evening services allow of anyone reaching the capital from the most distant of the principal towns, spending 4½ hr. there and arriving home that night in comfortable time. As from May of this year there will be 2,300 seats ferried across the Great Belt daily.

The use of diesel vehicles for certain ordinary services has also been extended and trains of 7 vehicles, the end ones being railcars, seating 500 persons, are in operation and giving great satisfaction. Vehicles of this class are used for the Northern Arrow service from Flensburg to North Jutland which, with fast steamers from Frederikshavn, allows the journeys from Hamburg to Gothenburg to be made in 13½ hr. The *Lyntogs* were planned before the German Flying Hamburger service, but the latter provided many valuable suggestions used during the construction of the Danish trains.

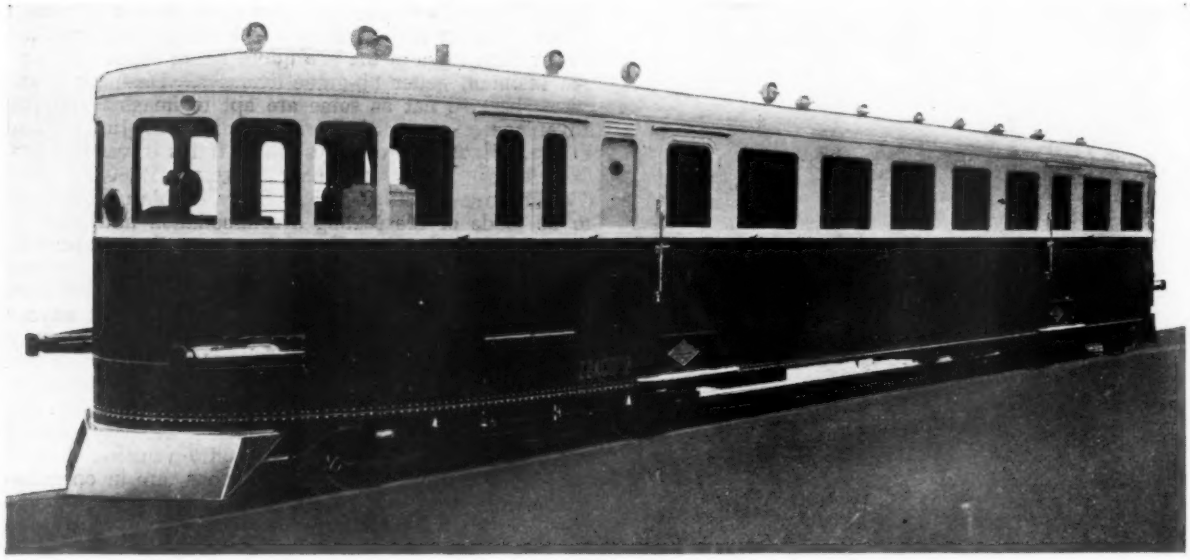
New Danish Diesels

The first one of the four new four-coach *Lyntogs* has been placed in service. It consists of two twin-coach articulated units and has air-operated doors, but in essential details it is otherwise similar to the previous three-coach trains. From the introduction of the summer train services on May 22, all long-distance services will be remodelled on a more extensive scale than when the Little Belt bridge was opened in 1934. The present high-speed diesel services Kronjyden and Østjyden will be supplemented by Nordjyden and Midtjyden (The North Jutlander and The Central Jutlander, respectively) in the opposite directions, so that all the towns served will have both a morning and an evening service in both directions daily, including Sundays. A new high-speed service to the west coast of Jutland (Vesterhavet, *i.e.*, The Western Ocean, the Danish name for the North Sea) will leave Copenhagen for Ringkøbing via Esbjerg in the morning and return in the evening. The present Esbjerg service, Vestjyden, will be renamed Englænderen (The Englishman) and will be reserved entirely for passengers to and from England via Esbjerg-Harwich; it will leave Copenhagen 35 min. later than now, and the return service will arrive in Copenhagen 65 min. earlier than now, but the actual running times will remain more or less unchanged. These high-speed services will be supplemented by a number of semi-fast diesel services on the secondary lines connecting with the *Lyntog*.

RAILCAR OPERATION IN SYRIA

An account of the working and repair of four diesel-mechanical vehicles with bogie-mounted two-stroke engines

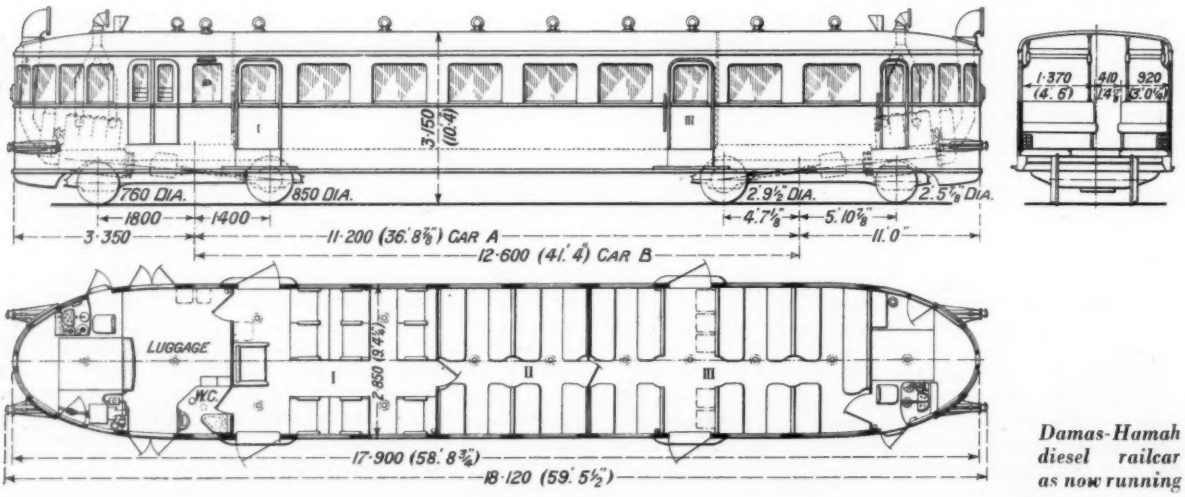
By CHARLES GODARD, Ingénieur en Chef du Service Matériel et Traction, Chemin de fer Damas-Hamah et Prolongements



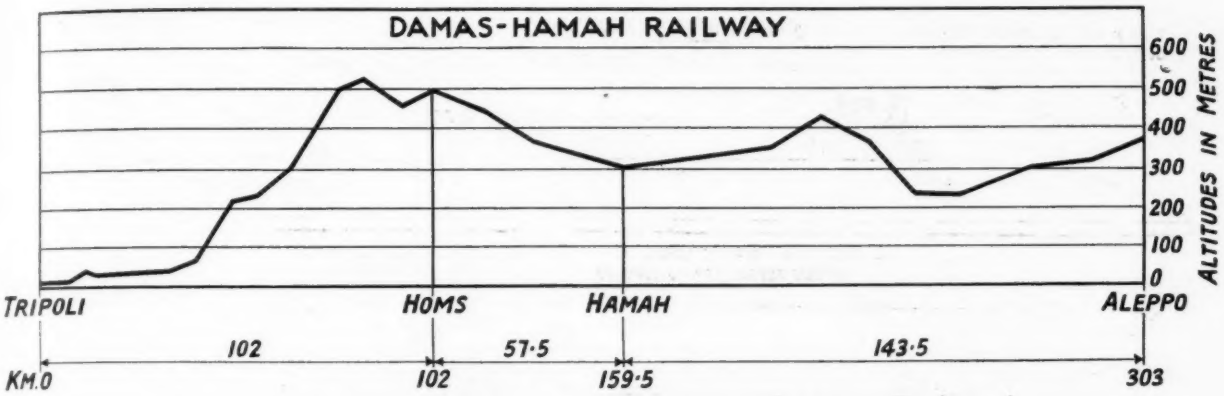
The first of the four diesel railcars of the Damas-Hamah Railway as built originally

BY the introduction of a diesel railcar service between Tripoli and Aleppo an appreciable reduction in travelling time has been made possible compared with steam traction, for the condition of the track would not allow of the speed of steam trains exceeding 60 km.p.h. (37 m.p.h.) over the greater part of the 303 km. (188 miles) separating these two towns whereas the diesel cars are permitted a maximum speed of 85 km.p.h. (53 m.p.h.) over most of the route. Steam trains took nine hours including stops, whereas the railcars make the run in five hours although as may be seen from the accompanying profile there are long grades to be surmounted, the maximum being a 25-mile climb at an average of 1 in 40 between Tripoli and Homs.

The four railcars of the Damas-Hamah Railway are of the double-bogie double-engined type built by De Dietrich. They were described in the issue of the *Diesel Railway Traction Supplement* for January, 1935, but their main features may be recapitulated. Motive power is provided by two CLM-Junkers two-stroke opposed-piston engines with four cylinder sets, the output per engine being 105 b.h.p. at 1,500 r.p.m. Each engine is mounted on one bogie, together with its four-speed Mylius gearbox which drives only one axle of the bogie. There is a



Damas-Hamah diesel railcar as now running



Gradient profile of the standard-gauge Damas-Hamah Railway from Tripoli to Aleppo

driving position at each end, but the interiors of the vehicles are to two designs. The two cars of class A have 11 first class, 20 second class, and 34 third class seats, and tare 27·5 tonnes; the two cars of class B seat 11 first class, 26 second class and 34 third class passengers, and tare 28·75 tonnes. Cars B are 1·4 m. (4 ft. 7 in.) longer than those of class A, as may be seen from the accompanying diagram.

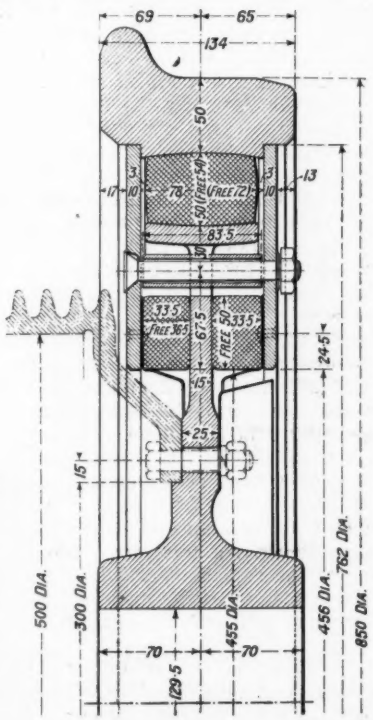
Heating of the passenger compartments is by means of the engine cooling water and the lighting is electric. The bogies are of the double-suspension type with De Dietrich elastic wheels and S.K.F. roller bearing axleboxes. The braking equipment comprises an oil-pneumatic system operating on drums between the wheels; an electromagnetic rail brake; and a handbrake acting only on the driven axles. The body panels of the cars are of chrome-copper steel. The maximum track speed at 1,500 r.p.m. engine speed is 90 km.p.h. (56 m.p.h.) and this speed can be maintained easily on the level, with a rate of 65 km.p.h. (40·5 m.p.h.) up a grade of 1 in 83, and 45 to 50 km.p.h. (28 to 31 m.p.h.) up a grade of 1 in 50. The cars are operated solo and no provision is made for the haulage of trailers.

Operating Problems

From the inauguration of a diesel service in January, 1935, it became obvious that the two principal problems would be the efficient cooling of the engines and the organisation of proper maintenance and repair methods. The ambient temperature in Syria attains 40 to 45 deg. C. (104 to 113 deg. F.) in the shade during the summer, and surfaces exposed to the direct rays of the sun have a much higher temperature. For the proper operation of the engines the cooling water temperature had not to exceed 75 to 80 deg. C. (165 to 175 deg. F.). But it was ascertained that in the early period of service the temperature of the cooling water was rising to 95 deg. C. (200 deg. F.), and damage to the engines resulted. The cooling system consisted of a fan-cooled radiator mounted on the front of each bogie, air being drawn in through adjustable openings in the ends of the car. To assist the cooling of the trailing engine and equalise the water temperatures of the two engines, the front engine was connected to the trailing radiator and the rear engine to the leading radiator. A pipe down each side of the car connected the two engines and radiator sets.

The radiator and connecting pipes originally were of steel of 28/33 mm. (1·1/1·3 in.) inside and outside diameter, but this was too small and the diameters were increased to 45/50 mm. (1·78/1·97 in.) and the material changed to copper. By means of these changes the heat loss was increased, and thus the engines were cooled a little more effectively, and the temperature between the two ends was more nearly equalised. A study of actual conditions showed also that about 30 per cent. of the radiator surface was not being swept by the air drawn in by the fan, and that the rear radiator did not receive nearly sufficient air. To overcome these inconveniences rotating induction cowlings were fitted to the roof of the car at each end, and large-diameter ducts led from them to outlets just in front of the most ineffective portions of the radiator. By reason of the speed of the car the air now rushes past the radiator elements with some force, but of course is additional to that pulled through by the fan. This arrangement also has solved the difficulty of getting sufficient air through the radiator at the trailing end. The cowlings are turned when the railcar is reversed, and in winter it has been found possible to remove them.

It was found also that the induction air of the engines themselves was being drawn in at a temperature of about 60 deg. C. (140 deg. F.), as it was drawn in directly



De Dietrich elastic wheel as used on the Damas-Hamah railcars. By means of two independent rubber inserts both vertical and lateral shocks from the rails are damped out in the wheels themselves

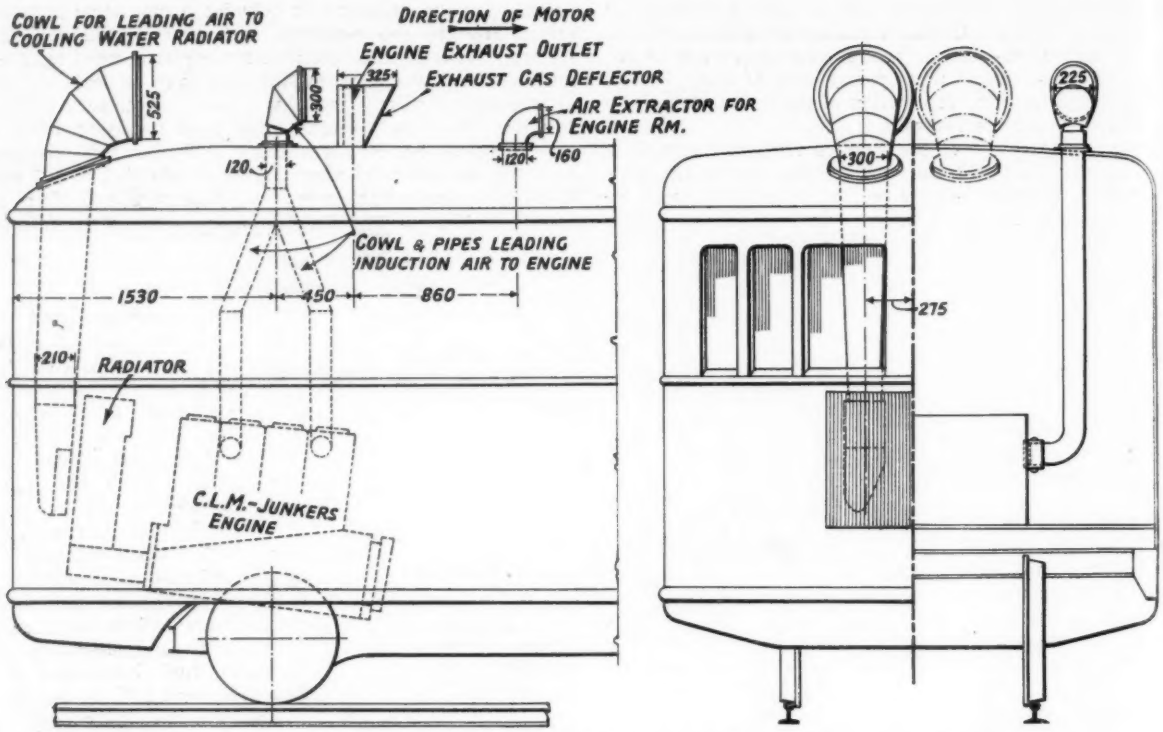


Diagram showing arrangement of cowlings and ducts fitted to the railcars of the Damas-Hamah Railway to improve engine cooling

from the engine sides, where the air temperature is effected by the exhaust, and to bring in fresh and unadulterated air a smaller cowl was fitted to the roof of each engine room and two ducts brought down from it to each intake.

The engine lubricating oil also showed a tendency to get too hot, and therefore a supplementary cooling coil was fitted to the sump. The coiled tube is of copper tube of 9/11 mm. (0·355/0·435 in.) diameter, and provides a trifling heating circuit for the railcar in normal weather. During the summer the engine cooling water circuit for heating the car is cut out, but the sequence of flow can be arranged so that the circulating water pump forces the water over this coil, thus cooling the lubricating oil and at the same time furnishing a small amount of heat for passing round the saloons. This simple improvement further allows the circulation of hot cooling water over the coil to heat the lubricating oil in winter before going into service for the day, and thus relieving the electric starters of difficulty in turning the engine over.

Together with some detailed modifications such as the strengthening of the radiator carriers, and alterations to the temperature control and the water circulating pumps, the above improvements have resulted in the cooling water temperature being lowered by about 25 deg. C., that is, to about 70 deg. C. (158 deg. F.), and the benefits of this have been shown in the reduced maintenance costs. Over the period from May 1, 1936 to February 28, 1937, that is, after the improvements were carried out, the four railcars covered a total of 190,000 km. (118,000 miles), or at the rate of 57,000 km. (35,500 miles) a year over the heavily-graded routes without any engine failures or troubles, although the summer of 1936 was very hot.

Railcar Services

The service worked each day comprises one train a day in each direction between Aleppo and Tripoli, two cars being used. A third car is held in reserve, and the fourth vehicle is held as being under inspection or repair. From January 1, 1935, when railcar operation began, to December 31, 1936, the aggregate distance covered was 617,000 km. (383,000 miles), of which car No. 1 accounted for 187,000 km. (116,000 miles) or 93,500 km. (58,000 miles) a year. The least mileage was that of car No. 4, 124,000 km. (77,000 miles), but only cars 1 and 2 were in service for the full two years.

Each car has its own driver and assistant driver, and over the driving personnel of the whole four cars is a leading driver (*chef mécanicien*). The depot and repair works are at Aleppo, and there is no special equipment at Tripoli. Any necessary repairs or adjustments during the lie-over at Tripoli are carried out by the driver and his mate. Several spare parts are carried in the cars.

Maintenance and Repair

The railcar repair shop at Aleppo is in charge of a foreman who has under him seven skilled and five semi-skilled workmen, and a small selection of tools including a lathe, vices, drilling machine, and *fraiseure*.

An important adjunct is the test bench for the oil engines, and which includes all the necessary apparatus for the calibration of the fuel pumps and injectors and the checking of the fuel consumption. The engine being tested drives a dynamo whose output is absorbed by resistances, which can be cut in or out to vary the load. The repair shop includes special measuring instruments and apparatus for checking the crankshaft measurements and angles, for truing up the main and camshaft bearings, checking the alignment of the rods, and forcing cylinder liners in or out.

Maintenance and repair is organised under three headings, viz., (1) normal daily running maintenance and light repairs; (2) periodical inspection and repair of the engine

and certain other constituents; (3) a general overhaul of the complete railcar. Ordinary maintenance is undertaken by the staff of the railcar repair shop according to the drivers' reports entered in a special book at Aleppo shed. A daily inspection and lubrication of the car is carried out by the driver and his assistant.

The principal parts of the engines are given periodical attention. Every 3,000 km. (1,860 miles) the repair shops undertake a general cleaning of the engine, and check up the lubricating system and the fuel injectors. Every 10,000 km. (6,200 miles) they drain off and replace the engine lubricating oil and the gearbox oil, and check up the lubricating system. After 20,000 km. (12,400 miles) the engines are given a complete inspection and the constituents repaired, adjusted, or replaced as necessary, and the fuel and lubricating systems are given attention. This last visit to the repair shop usually occupies four or five days. Every 40,000 km. (25,000 miles) an even more detailed dismantling and inspection takes place, in which all the bearings, pistons and pins are tested for play and adjusted as required; the cylinder liners measured for wear and trued up if necessary; and the normal work of the 20,000 km. revision carried out. This takes about eight days.

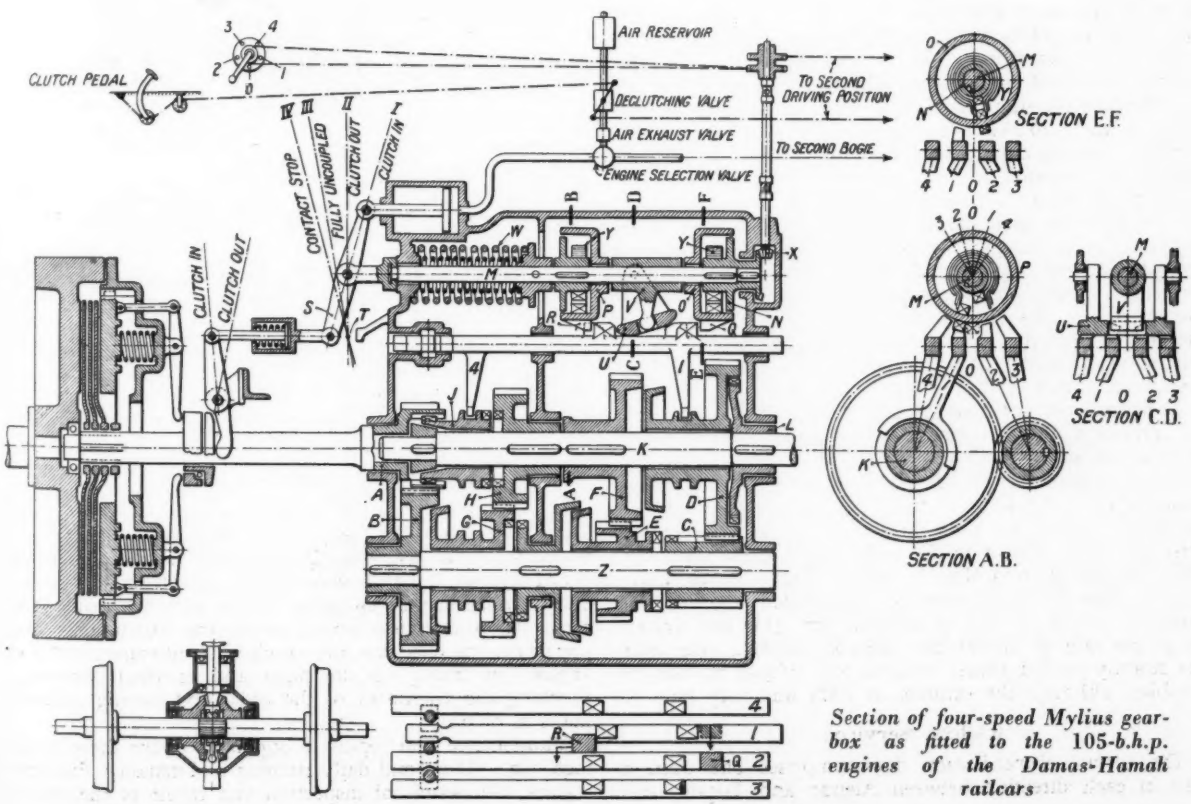
A thorough overhaul of the complete vehicle is scheduled for every 80,000 km. (50,000 miles) and this occupies about 30 days. The bogies are completely dismantled, the tyres turned, the body and its fittings and equipment reconditioned and painted inside and out, the engines, gearbox, axle drives, cables, heating apparatus, and all auxiliaries cleaned, inspected, and repaired. On this occasion the engine is put on the test bench after re-assembly, for checking the fuel injection apparatus, timing, fuel consumption, and to give the engine a short run-in.

At main overhauls the principal repairs required by the engines are the replacing of cylinder liners, some pistons, remetalling the rod bearings, and renewing the fuel injectors. None of these constituents regularly need replacement at the 80,000 km. revision, and may be dealt with at intermediate repairs if they have become necessary. Both cylinder liners and pistons have been found to have a life of at least 80,000 km. (50,000 miles) but fuel injectors as a rule are renewed after 40,000 to 60,000 km. (25,000 to 37,000 miles). The life of the fuel pumps is often as much as 150,000 km. (93,000 miles). Replacements of transmission constituents are rare.

Actual Results and Costs

Most satisfactory results have been obtained during the two years the cars have been in service, and travellers have definitely appreciated the rapid and comfortable service, which in summer is augmented by the installation in the luggage compartment of a small buffet to serve cooling drinks.

Over two years' operation the fuel consumption has averaged 52 litres per 100 km. (about 1.56 lb. per mile), and the lubricating oil consumption 2·95 kg. per 100 km. (0·105 lb. per mile). The oil used by the gearbox and reversing gears (changed every 10,000 km.) amounts to 0·5 kg. per 100 km. (1·77 lb. per 100 miles). The operating expenses are illuminating, for they show the effect of the general overhaul on the cost sheet. Covering crew's wages (driving and traffic), repair and maintenance (material and labour), supervision, fuel, lubricating oil, heating, lighting, &c., the expenses were 1·73 fr. per km. in 1935 and 2·26 fr. per km. in 1936, but the average of 2·0 fr. per km. would seem to represent a fair value taken over a long peroid. Despite the relatively low fares, the average receipts of these cars amount to about 3·75 fr. per km.



Section of four-speed Mylius gearbox as fitted to the 105-b.h.p. engines of the Damas-Hamah railcars

NOTES AND NEWS

Mylius Transmission.—Two sets of 150-b.h.p. Mylius mechanical transmission, to go with M.A.N. engines, have been ordered for service on a Swiss line, and 16 sets of 110 and 160 b.h.p. for French railcars.

A Michelin in Central Europe.—A 56-seater Michelin pneumatic-tyred railcar was given a fortnight's trial recently on the lines of the Czechoslovak State Railways, principally in Moravia. It ran under its own power from the Michelin works at Clermont-Ferrand to Prague via Switzerland and Austria, and returned by the same route.

Berlin Motor Show.—Among the engines exhibited at the 1937 Berlin motor show were a 500-b.h.p. 12-cylinder vee Deutz engine with a Büchi supercharger ; a 12-cylinder horizontal Deutz engine of 275 b.h.p. ; a 180-b.h.p. D.W.K engine ; and Daimler-Benz railcar engines of 150, 300 and 450 b.h.p. Several sets of Mylius mechanical transmission were on show also.

New French Railcar.—The first railcar in France to be powered by the Frichs type of oil engine is undergoing trials on the French State Railways. The vehicle was built by Corpet, Louvet & Cie, who hold a licence for the Frichs engine. Power is supplied by two 240-b.h.p. engines and the transmission is of the electric type with two traction motors. The car tares 61·5 metric tons and has 60 seats.

Egyptian Railcars.—The first of the twin-unit close-coupled Ganz diesel-mechanical cars ordered by the Egyptian Government Railways has been put into service on the Cairo-Helwan suburban line, and the remainder will follow shortly. These units have first and second-class accommodation. The present 240-b.h.p. single-unit Ganz cars, with first-class seats only, are being transferred to other routes.

Nord Railcar Mileage.—The ten 240-b.h.p. double-bogie Renault cars belonging to the Ch. de Fer du Nord covered an aggregate of 1,090,000 km. (678,000 miles) in the 12 months ending January 31, 1937. One of the cars covered 115,000 km. (71,500 miles) up to January 11, and then was dismantled for inspection and repair. The condition was such that the body and certain other parts were considered to be capable of at least 180,000 km. (112,000 miles) before repair. All these Renault cars operate from the Amiens depot.

Quick Servicing in the U.S.A.—Improved lighting, fuelling and servicing equipment has been installed in the 14th Street yard, Chicago, by the Burlington Railroad, in view of the quick turn-round of some of the Zephyr trains. For instance, the seven-car Zephyr arriving from the Twin Cities at 3 p.m. is booked out again at 4 p.m., and thus has actually only about 20 min. in the yard before beginning its 440-mile return trip scheduled at 66 m.p.h. The other Twin Cities Zephyr arrives at 11 p.m., and is out again at 8 a.m. ; the 12-car Denver Zephyr arrives at 8.40 a.m. and leaves again at 5.30 p.m.

Speedometers.—The work performed by shunting locomotives constitutes an item in railway expenditure which is not only considerable, but also very difficult to check accurately by ordinary means. This work is normally accounted for in shunting hours, the returns being based merely on the estimates of the employees engaged. In terms of distance covered the work done is ascertained indirectly and by rule of thumb, varying between 3 and 6 miles per shunting hour, according to the practice and working conditions adopted by the different railway companies. The difference between these two limits shows up very clearly the doubtful value of this method of ascertaining the work done.

Something more accurate being required, diesel locomotives and railcars are fitted almost universally with speedometers of the recording type. A pattern used in this country, India, and Australia is the AT magnetic speedometer, made by British Jaeger Instruments Limited, of London, N.W.2. The particular instrument illustrated is that fitted to the Armstrong, Whitworth shunting locomotives of the L.M.S.R., which gives readings up to 40 m.p.h. in either direction, and records the aggregate mileage up to 100,000.

The main spindle to which the cable is coupled carries a rotating magnet of special patented design. In the new

AT magnetic speedometer as used for diesel locomotives

light-weight instruments the magnet is fully compensated as to be unaffected by temperature changes, and is also shrouded in order not to interfere with, or be affected by, any other electrical instruments which may be fitted to the dashboard. This magnet is so powerful that speeds can be registered from zero. Around this magnet is disposed a light duralumin cup, which is connected to a hair-spring and indicating hand. When the drive shaft is revolved a magnetic field is produced ; as the magnet revolutions increase, the magnetic field moves round and pulls the duralumin cup, with the indicating hand, around with it. It will be seen that this duralumin cup with its indicating hand is not connected mechanically with the drive-shaft in any way. It is only influenced as to its movement by the increasing power of the eddy currents produced by the magnet, in accordance with the drive r.p.m. The speed indicating mechanism just described is carried on two jewels fitted into small adjustable screws, so that perfect poise can be established, in a similar way to that obtained in the highest grade scientific instruments. In this way a perfect sensitive instrument, entirely unaffected by road shocks or vibration, can be produced. Each instrument is carefully hand-calibrated to give exact accuracy at all speeds.